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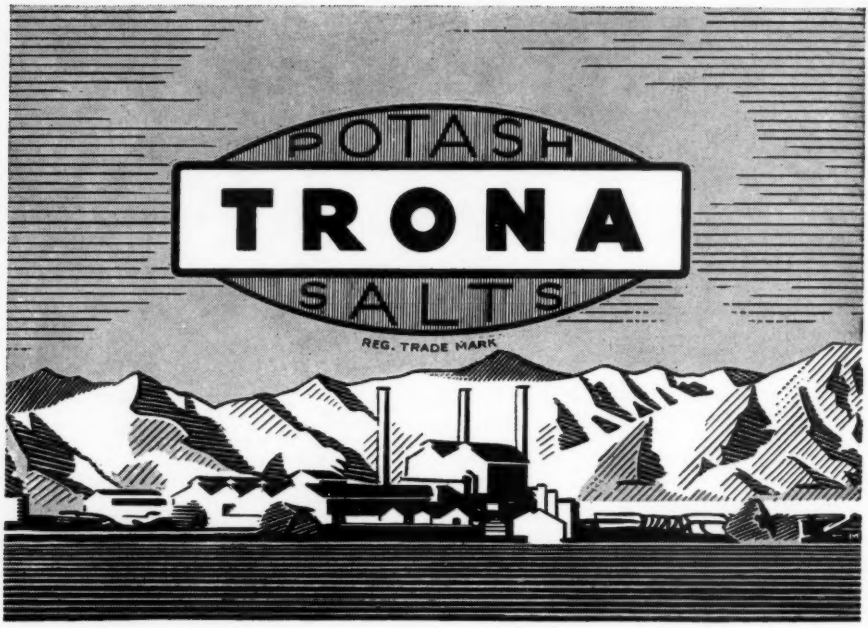

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Better Crops with PLANT FOOD

The Whole Truth — Not Selected Truth

R. H. STINCHFIELD, *Editor*

Editorial Offices: Investment Bldg., Washington, D. C.

VOLUME XX NUMBER SIX

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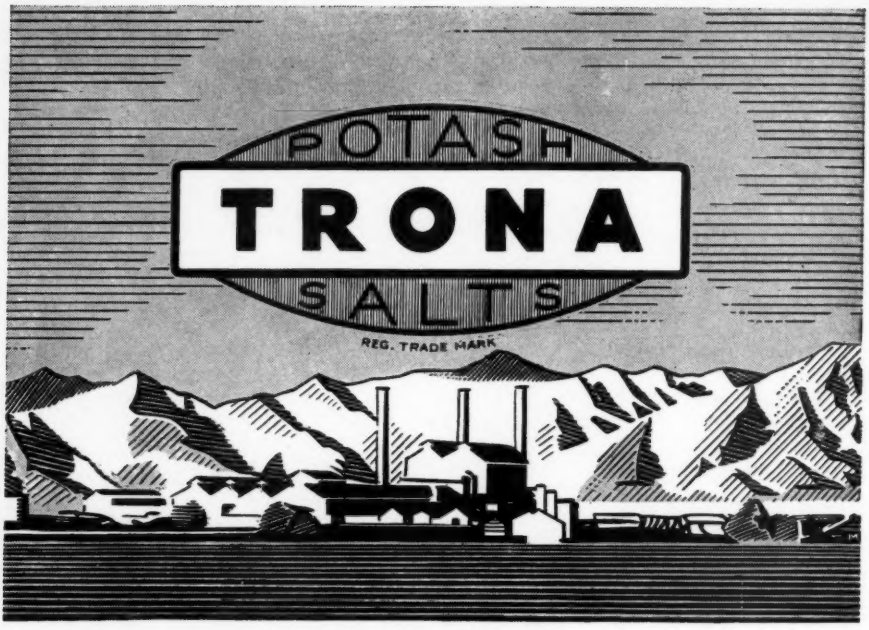

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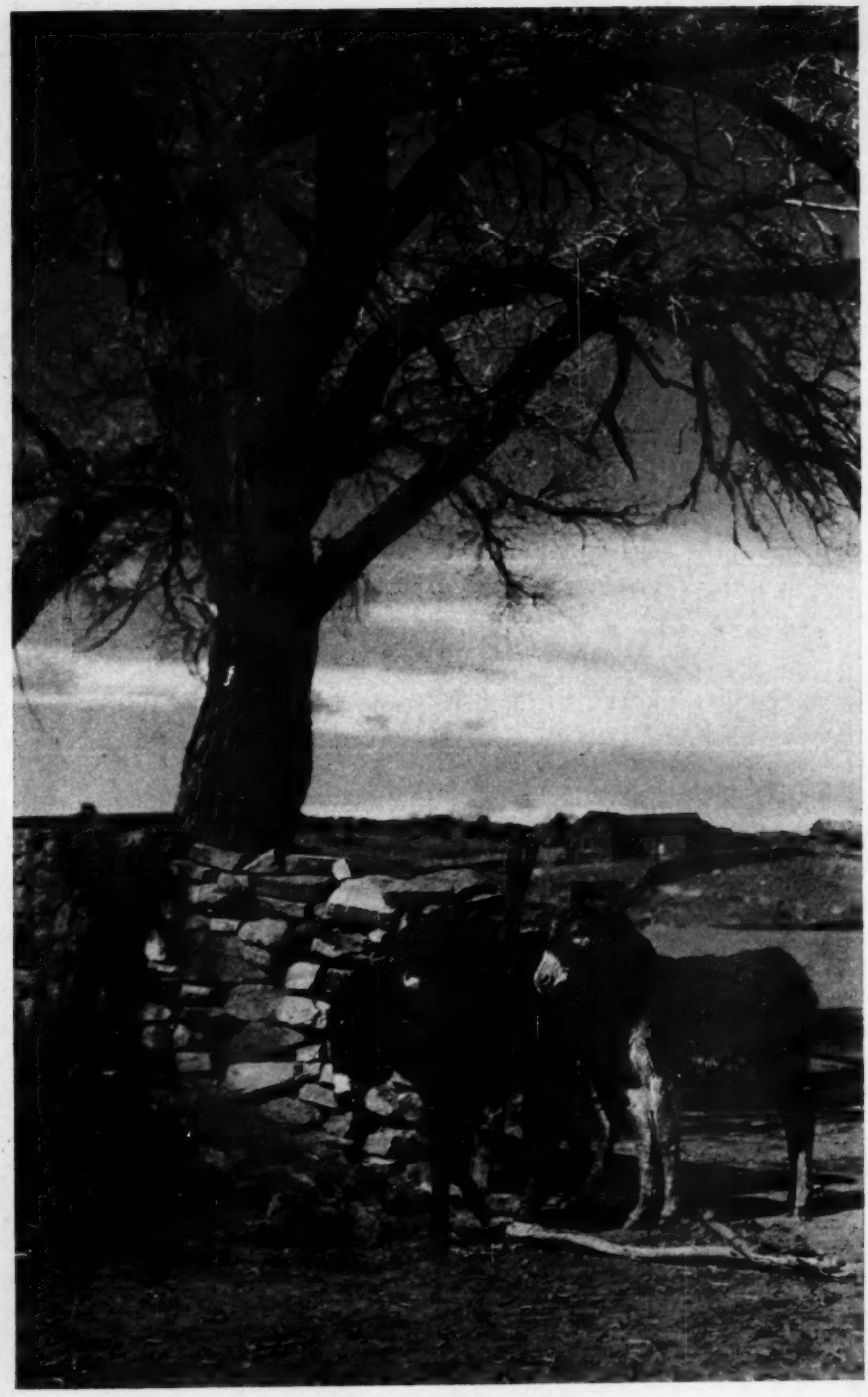

A SIESTA IN THE SOUTHWEST

Better Crops with PLANT FOOD

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VOL. XX WASHINGTON, D. C., FEBRUARY, 1936 No. 6

Jeff says, you can't get away from - - -

Communication

By Jeff McDermid

COMMUNICATION is so remarkably refined these days that you get an answer before your question, the hermit business is becoming dreadfully discouraging, and the words "remote" and "isolated" are being squeezed into the obsolete department of the dictionaries. Between the sign language and the smoke signal times in America and the advent of radio-television in 1936, less than a hundred years have passed. Keeping close touch by quick travel and rapid communication is the mania of the age.

To get away fast and to be aware instantly are the possessions this generation hands to the next. Yet some folks are almost frazzled-out by the speed of speech and the surfeit of song, to a point where they would like to get away from being aware. But you can't often accomplish it.

Go on the train and you have newspapers thrust at you or spread open in the seat ahead. Messengers urge you to send flowers or one last fond farewell. Move into the parlor-car and the loud-speaker is blaring. Thumb a chance overland ride and the flivver has a cute little set tuned in on the prize fight. Dive into a dining room and you'll victualize a la Vallee.

Dodge into a secluded movie and you take in the simpers and shanks of the beach beauty contest or the squeaking sentiments of the Hon. Hilatus Horseface, who wants your vote.

Run to a barber-shop and get scratched to jazz music. Step in a taxi and hear the latest crooner before the crash. Hide in a hotel lobby and the bell-hops page you with telegrams. Hustle out to Uncle Sodcorn's shack in the sticks and listen to the hog-calling contest's semi-finals, with extra selections from Major Bungle's amateur potpourri. Rush home in despair and find a bushel of accumulated newspapers at the front door, a cablegram in the mail box with the overdue bills, and the long-distance bell jangling in the study.

Of course, to a Scotchman there is a ray of comfort in it anyhow. Take a bargain-store receiving set and one can save several berries in travel and tips just by swinging through one arc of the dial pointer. And to the dumb as well as the dour, radio is a boon indeed. It doesn't require any reading or any education to enjoy most of the big-time programs. They are so very audible and the acme of relaxing simplicity! Thinking is useless anyhow in a political campaign year.

TO an occasional orator like myself the radio forum has few charms compared with getting a corner on some visible audience for half an hour's mutual endurance test. If I first see that the exits are locked, no hill-billy chorus or saxophone symphony may displace me, and my wavelength is limited solely by the length of my arms. If there are any economic enemies or other stubborn ignoramuses in the crowd I can see the effect of my galling cross-fire—but unfortunately, I can't dodge theirs! Radio audition has surely saved eggs as well as money.

Yet despite its commercial debasement, as some call it, the frills of modern communication have done wonders to us after all. It took nearly a month for Americans to know how badly Dewey licked Servera at Manila in 1898. It required six weeks to settle the Tilden-Hayes political scrap of the seventies; and some folks in the still Kentucky mountains, or even in my own metropolis, didn't hear about the Volstead law before it was repealed.

THINK of all those epochs going by unannounced by any announcer! And tonight I can hang onto the last brave words of Paulino Upsidedown before the brown bomber drops one on his konk with a resounding smack which vibrates in the serenity of my family circle! And what is still more edifying, I can sit up in the bleak hours of a summer dawn and hear the delegation from my own state join the Townsendites in a triumphal march around the stadium where they expect to pick a president. It is so realistic that I can almost feel the two hundred smackers bulging my breast pocket in a vain attempt to be spent! It's a great old life, if you'll only listen.

There are two kinds of radio rackets—the audible and the subtle. You can snap off or tune down the first kind, but I reckon the federal communications commission is the only authority left of the alphabetical family which can control the other. If the air is one of our natural resources, we'll have to keep it fresh and open and not let it go the sad way of the buffalo, the big trees, and the N. R. A. The electrical engineers have come a long ways since Ben Franklin yanked at his key and kite, but the ones who plan the programs and allocate the air lanes give us more static than the achievements of science justify.

I wonder if Heinrich Hertz and the Marches Marconi would have worked so long and patiently with world benefaction in mind had they

known that Snozzle, Pop-eye, and the Tin Pan Troubadours would finally monopolize the ether. I bet they would have gone into the plumbing business. One noise is as good as another.

A feeble effort with a few courageous supporters is being made to put a little culture into the broadcasting business. It has to be done gently and slyly so as not to scare away the

dialers. If they could set calculus to music and give coupons and guessing premiums with every package of erudition, no doubt the profs might get a better chance at the microphone. If we could take our proposed colleges of the atmosphere and add a few hot-dog fraternity and sorority stunt nights interpolated into the mess, I am certain that even King David Sarnoff would admit there was something valuable in home education. As it is now, all the time the spectacled lads get in the sending room is between noon and sunset. It's better so, because they can't get used to the night life anyway, and too much "home work" is discouraged by modern theory.

I CAN recall when the rural telephone first busted up the solemn loneliness of the old farmstead. Before its advent we used to step outside and almost break our lung tissue hollering across the creek to neighbor Fish, either with the compliments of the season or a reminder for him to fetch back the cross-cut saw. My father was proud of his oral immensity, his ability to shout so loud that a deaf uncle could hear him even when he owed him fifty cents. I tried my best to imitate his vocal attainment, but only came within half the volume when he led me to the woodshed. Neither inheritance nor environment did me any good when it came to dispensing with a telephone, as he was able to for three-score years, merely on the power of his larynx. No doubt the huskiness of modern speech is traceable to the loss of some intangible factor not unrelated to the coming of the speaking wire—that and "speakeasies."

WE experienced the crank ringing era, the lightning-plug inhibition, and the community listening-in excitement, all the part and parcel of early rural telephony. Rubbering by all hands around has ceased to some extent since the radio put the world in the woman's kitchen. Check that as one more credit mark for broadcasting.

No sophisticated modern youngster with his complete home-wiring kit and latest do-dads for wireless experiments has any greater fun I am sure than my chum, Earl, and I enjoyed trying to talk to each other from adjacent barns with waxed twine and baking-powder tin receivers. That was in the days when our folks used to recite Darius Green to us, probably to remind us that he also monkeyed around the barn once too often with his flying contraption. None of us ever dreamed that before the next generation saw the light, men would be hearing the voices of daring men in the stratosphere.

Likewise if my memory serves me right, our family stood in awe of a neighbor who regularly staged spiritualistic seances. I remember standing near my mother's chair with my hair on end while a visiting "medium" obligingly invoked the aid of an In-

dian sachem in the happy hunting ground, to bring us messages about curing aunt's rheumatism and the outcome of the pickle harvest.

TODAY we live and move constantly in a vast realm of commonplace mystery, voices and messages from distant lands, bells from overseas, and vivid magnetism at the touch of a finger, each more marvelous and ghostly than any of the antics they used to spring upon us in the dim parlors of yore. I enter a theater and both see and hear the friendly form and accents of one of the lovable native noblemen of our times, now riding the range with the angels. I lift a disk from a dusty corner and the needle traces out the songs of a voice long stilled. The onrush of hurricane, the advent of bitter frost, and the first overture of spring's sonata are told to us in continental messages by weather men and electrical wizardry.

On Christmas day we listened with moist eyes to the grand mass chorus of Canadian choirs, swinging with perfect harmony and quality from the friendly shore of Vancouver Island washed by the Japanese current to fog-shrouded Halifax in the "Maritimes." Actually, we forgot all about the reciprocal tariff business for awhile under its spell.

They have always said with truth that "the good men do lives after them." Hitherto it has been books, music, and art objects on which we depended for silent communication with departed friends. In our present era a step ahead is taken, and we reproduce the face, the form, and the vocal pronouncements after the life is no longer ours to share. To extremely excitable or sentimental folks this may be too poignant for comfort, but at any rate, it preserves communication from complete finality in the grave. No other age of mankind has achieved that, unless the powers of the Incas and other prehistoric races are underestimated.

What challenging conceptions dare we imagine lie ahead in the eager minds and hearts of skillful scientists, never content to dawdle along in satisfaction while any haunting question stays unanswered. We are on the threshold of communication with the infinite—even though we must stand for a little punishment of evenings from the "music which goes around and 'round and comes out y'har!"

If our memories were better we might do without printed means of communication in this era of ours. I knew a sort of street-corner showman in our city who prided himself on getting dates, names, facts, figures, and other assorted jumbles fixed like cement in his cerebellum on one or two trials. Some lodges claim to have no written ritual, and several villages have dispensed with what used to be thriving newspapers. This hint seems outlandish no doubt as you scan the pink and purple rows of garish pulp magazines and tabloids in the depot. But memory experts and literary tasters have no rank in our times, hence it will be a long time before we cease to reread the radio news flashes or become communicative with ourselves under the study lamp. Besides, there are so many of us who can write—or think we can—better than we chat.

TYPE is here to stay I guess, because they have invented mystic typewriters which peck out stories and articles sent from limitless places, and supply copy hot off the griddle to the clanking Mergenthalers and the roaring Cottrels. It takes fast thinkers to keep pace with the devouring demand of the modern field of published communications. No wonder some of them have to tell sewer stories to hide their lack of real skill.

(*Turn to page* 45)

In this field of bright tobacco on the farm of H. S. Powers, South Hill, Va., the tobacco on the left received 1,000 lbs. of 3-8-3 fertilizer per acre before planting. Note the difference in growth and quality of the tobacco on the right which received 1,000 lbs. of 3-8-14.

Virginia Tobacco Needs Potash

By E. M. Mathews

Superintendent, Virginia Agricultural Experiment Station, Chatham, Va.

WHILE history records that Christopher Columbus was the first white man to introduce tobacco to the Old World, Virginians are proud to record that it was John Rolfe, husband of Pocahontas, who was the first civilized grower to raise tobacco for export, thus entitling Virginia to the distinction of "Birthplace of the American Tobacco Industry."

For more than 300 years tobacco has ranked high among the industries of Virginia. Dating from the arrival of our first permanent settlers at Jamestown in 1607, where the habit of smoking was acquired and the settlers learned from the Indians how to grow the weed, "Virginia has made tobacco, and tobacco has made Virginia." Almost every phase of her economic and social life has been enriched through the wealth created by this industry.

Some idea of the importance of the tobacco crop in Virginia can be ob-

tained by comparison of production in this State with the United States as a whole. The total production of all types of tobacco in this country in 1933 was approximately 1,400,000,000 pounds representing an acreage of 1,757,000 or more than 11 pounds for every man, woman, and child in the country, about double the per capita consumption. This amount of tobacco, loaded 2,000 pounds to a wagon, would make a wagon train reaching from New York to California with enough left over to extend across the State of Virginia at its widest point. For the same year there were grown 83,400 acres of bright flue-cured, 32,800 acres of dark fire-cured, 2,800 acres of sun-cured, and 13,000 acres of burley tobacco in the State of Virginia.

Increased Consumption

This comparatively small Virginia crop of 132,000 acres produced 97,046,000 pounds valued at $12,416,000; 74 per cent of this total value was obtained from the 57,712,000 pounds of flue-cured leaf produced. This fact, together with the increase in cigarette consumption in the United States from 3½ per cent of the total consumption for all types of tobacco in 1900 to 40 per cent of the total in 1933, serves to emphasize the importance of Virginia flue-cured tobacco and prompts the writing of this article which, besides giving something of the history of the tobacco industry in the state, is aimed at developing a system of fertilization which will insure larger yields of better quality tobacco and more satisfactory income to tobacco growers as a whole.

In the early Colonial days Virginia produced most of her tobacco crop around Jamestown and in Tidewater Virginia. Most of this was air-cured leaf. Later curing was assisted by open fires placed in trenches in the barn directly underneath the tobacco. This developed the dark fire-cured type. The very latest process of curing tobacco leaf, that of flue-curing, was developed fairly recently, only about 70 years ago. By this method the golden cigarette leaf is cured within a few days after harvest by the use of steel flue pipes which conduct heat through the barn. This method has surpassed all others in producing mild, sweet smoking leaf, and this type has so increased in demand that today more than half of all of the tobacco produced in America is of the flue-cured type.

Industry Shifts

Since the early Colonial days of Virginia, her tobacco industry has gradually shifted from Tidewater Virginia to the Piedmont section. Today one can scarcely find a tobacco plant growing around Jamestown, while thousands of farmers throughout Piedmont Virginia depend entirely on tobacco as a cash crop. Why this shift in tobacco growing? In the opinion of the writer it was brought about principally because of the three most essential factors in tobacco growing, namely, soil type, plant food, and topography.

Tobacco is a plant which thrives best in virgin soil rich in humus and plant food. The soil must have good drainage, for the plant cannot stand wet feet. The soils of eastern Virginia are flat, while those of the Piedmont area are very rolling, thereby affording better drainage. Too, the newly cleared forests of the rolling Piedmont section were found to have sandy loam soils not only rich in humus, but with fine clay subsoils rich in plant-food elements needed for tobacco growing, especially potash. These soils were found to produce that sweet, aromatic, silky type of leaf so pleasing to the touch and tempting for its flavor, which, due to its justly earned world-wide reputation, always finds a ready market. Thus the old fields around Jamestown were

abandoned for new virgin soils of the Piedmont area, soils still rich in potash content as well as other essential plant foods and organic matter, and with not so flat a topography.

The writer has often heard his father relate that 60 years ago, after he had cleared fields for tobacco, he could produce consistently finer quality crops (tobacco which was nearly all wrappers) than is possible today. His yields have been maintained and even increased through rotation and use of fertilizers, but 25 or more heavy crops of tobacco have taken more of certain plant-food elements from the soil than he has added in his fertilizers. Particularly is this true in the case of potash.

Tests have proven that an 800-pound crop of tobacco per acre removes from the soil 100 pounds of potash. The 25 crops produced on each field of the farm just mentioned averaged 1,200 pounds per acre. On the average these crops were given 1,000 pounds of a 3-8-3 fertilizer per acre. This application would supply 30 pounds of potash per crop or 750 pounds per acre during the past 60 years. Each of these 1,200-pound crops removed 150 pounds or a total of 3,750 pounds of potash per acre for the 25 crops.

If the best tobacco farmers, during their lifetime, remove five times as much potash from the soil through their tobacco crops as they replace through fertilizers, is there any wonder that thousands of Piedmont Virginia tobacco fields become deficient in potash, and that thousands of Virginia farmers lay aside fields and often whole farms for new ones where they can produce better quality tobacco, the only gold known to many of them?

Tobacco has shifted from eastern Virginia to the Piedmont; it has shifted from old fields and old farms to new fields and new farms. It has been continually in search of better soils and of new soils rich in potash and other plant foods which are so essential for producing quality tobacco. This shifting to new fields when the

The plant on the left is from a plot fertilized with 3-8-14 at the rate of 1,000 lbs. per acre; that on the right is from the 3-8-3 plot. In both cases one-half the potash was from muriate of potash, the other half from sulphate of potash.

old ones have been sapped of much of nature's vital nutrients cannot go on forever. Science must help the farmer solve this problem. He must be taught, through the results of tests conducted at experiment stations and elsewhere, how to replace all of these plant-food elements removed from the soil through continuous cropping, so that it will not be necessary for him to look for new fields and new farms. It is with a view to this type of assistance that the writer gives the following results obtained from experimental tests conducted in Pittsylvania County, Virginia, in which the value of supplying varying amounts of potash for flue-cured tobacco was tested over a four-year period by the State Agricultural Experiment Station.

These tests were conducted on Granville sandy loam soil, a typical bright tobacco soil of the Piedmont, a light sandy loam soil with fine, yellow clay subsoil. Along the ridges where drainage is good, this type of soil produces excellent quality bright tobacco.

Accurate as Possible

The plots described in the following tables were produced on a field on which tobacco had been grown for many years, and during the last three years of these tests, tobacco followed tobacco annually. All plots were duplicated each year; the four-year averages therefore really consist of eight repetitions of each test.

Table I shows the average yield per acre in pounds and the dollar value per acre for the four-year period 1931 to 1934 inclusive, for plots receiving fertilizers containing 4 per cent ammonia, 8 per cent phosphate, and potash varying from none to 20 per cent. In each case 2 per cent of the total percentage of potash shown was derived from muriate and the remainder from sulphate and sulphate of potash-magnesia. The maximum acre value was obtained when 12 per cent of potash was used. This value was 69 per cent greater than that for plots receiving no potash, about 4½ per cent greater than value for plots receiving 4 per cent potash, and a small increase of $2 per acre over plots receiving 8 per cent potash.

Still More Potash?

Although these tests show quite conclusively that at least 8 per cent of potash is profitable for bright tobacco fertilizers, yet the writer feels that an even higher percentage would have proven more profitable, if the method of application had been corrected so that all potash over the initial 6 or 8 per cent had been side-dressed just ahead of cultivation, approximately three weeks after transplanting time. The method of applying all fertilizers, including as much as 16 and 20 per cent potash, in the drill before transplanting time, resulted in a poor stand of tobacco and retarded growth in all cases of high-potash applications, thereby reducing the yield and quality for such applications to such an extent that the values shown doubtless do an injustice to high-potash applications.

In Table II it can be seen that where tobacco is topped low for harvesting by cutting the whole plants, or medium high for harvesting by priming, and spaced wide apart so as to produce large leaf, the heaviest application of potash tested, that of 7 per cent, proved the most profitable; and increasing amounts of nitrogen proved less profitable. Where the spacing was crowded, however, to 24 inches and 18 inches, increasing amounts of nitrogen proved profitable, provided ample potash was also present to insure against low quality.

The comparative results obtained from plots in Table III indicate that a continuous and large supply of potash is essential where heavy nitrogen applications are used to obtain heavy yield. These plots were spaced 24 inches and topped high (about 16 to

TABLE I. Varying Potash—Tobacco Tests, Chatham, Virginia—1931 to 1934 Incl.

Plot	Fertilizer Analysis	1934		4-year averages	
		Pounds per acre	Value per acre	Pounds per acre	Value per acre
1	4–8–0	994	$174.08	814	$94.99
2	4–8–4	1194	297.15	1002	153.60
3	4–8–8	1368	334.27	1028	158.36
4	4–8–12	1292	334.01	1088	160.38
5	4–8–16	1325	320.99	1008	149.32
6	4–8–20	1202	284.08	986	139.93

NOTE: 4=4% ammonia—not nitrogen; 8=phosphate; Rate, 1,000 pounds per acre. Above results based on duplicate plots each year. The low four-year average values included two years of depression prices together with poor yields.

TABLE II. Fertilizer, Topping, and Spacing Tests—Chatham, Virginia—1931 to 1934 Incl.

Plot	Fertilizer 1000 lbs. per acre Analysis	Pounds and value per acre 4-year averages: Top 10 leaves (cut) Spaced 36 inches Yield	Value	Top 14 leaves Spaced 36 in. Yield	Value	Top 14 leaves Spaced 24 in. Yield	Value	Top 14 leaves Spaced 15 in. Yield	Value
1	3–8–3	671	$76.40	890	$127.76	941	$143.83	1015	$150.39
2	3–8–7	753	116.52	1001	169.19	1042	158.27	1016	154.54
3	4–8–6	678	101.43	942	132.17	1095	172.67	1022	156.45
4	5–8–6	590	74.79	973	129.42	1041	156.78	1056	176.98

Ammonia—not nitrogen basis used.

TABLE III. Fertilizer, Yield, and Value Per Acre—1932 to 1934 Incl.

Plot	Fertilizer	1934		3-year Averages	
		Yield	Value	Yield	Value
1	800 lbs. 3–10–6	1285	$360.55	1154	$207.61
2	Same plus 1 T. tobacco stems	1493	429.24	1336	238.81

3=nitrogen—not ammonia. The ton of stems added to plot No. 2 would increase the fertilizer equivalent to 800 lbs. of 4½–10–18.

TABLE IV. Fractional Applications of Fertilizers—Yield and Value Per Acre—1931-34 Incl.

Plot	Fertilizer 1000 lbs. per acre	4-year Averages: Yield	Value
1	3–8–5 before planting	1048	$167.17
2	3–8–5 before planting plus 0–0–5 20 days later	1324	185.11
3	1½–8–2½ before planting 1½–0–2½ 20 days later	1235	200.87

Ammonia basis used.

18 leaves). The sterilized tobacco stems, applied in addition to 800 pounds of 3-10-6 per acre, increased this analysis to approximately 800 pounds of 4½-10-18 and provided a continuous supply of both potash and nitrogen which lasted throughout the growing season.

Table IV shows just three plots taken from a series of tests conducted to determine the value of dividing the

This plant, which received a well-balanced N-P-K fertilization, was selected for seed because of fine quality, smooth leaf.

application of the different plant-food units of the fertilizer and of applying some plant-food elements about three weeks after transplanting. These tests show that extra applications of potash as well as nitrogen, about three weeks after transplanting time or when the crop is ready for the second cultivation, are very profitable. Similar tests conducted by individual farmers have proven equally as successful.

The writer in 1934 cooperated in conducting one farmer test in Pittsylvania County, Virginia, with results which concur closely to those just mentioned. This test was conducted on the farm of Eugene Carter of Dry Fork, Virginia, and on Granville light sandy loam soil. The tobacco was spaced about three feet each way and topped low for harvest by cutting. Mr. Carter used before planting 900 pounds per acre of 3-8-2 fertilizer. About 30 days after transplanting, extra sulphate of potash was applied as a side-dressing on a half acre plot of this tobacco just ahead of the cultivator to increase the potash from 2 to 12 per cent. The remaining half of the acre received no extra potash. The half acre receiving 12 per cent potash netted Mr. Carter 900 pounds and $325 per acre. The half acre receiving only 2 per cent potash produced 962 pounds per acre which sold for only $221.

Based on these tests conducted in Virginia and on similar experimental work in the Carolinas and other flue-cured tobacco-producing states, a committee of agronomists and tobacco specialists at their last annual meeting recommended in part the following fertilizers for bright tobacco for 1936:

(1) ***For heavy or more productive soils:***

Three per cent total nitrogen, 10 per cent available phosphoric acid, and 6 per cent potash, to be applied at the rates of 700 to 800 pounds per acre.

(2) ***For light or less productive soils:***

Three per cent total nitrogen, 8 per cent available phosphoric acid, and 6 per cent potash, to be applied at the rate of 800 to 1,000 pounds per acre.

With the above rates of fertilization where high topping is practiced and heavy yields are expected, the potash content may be increased to 8 or 10 per cent with profitable results.

(*Turn to page* 42)

Quality Celery Finds a Market

By M. E. McCollam

San Jose, California

ALTHOUGH celery growing takes on the extensive aspect in the Stockton Delta and Southern California areas, a smaller more intensively farmed center has been steadily developing in Santa Clara County during the past five years. At present, this is concentrated on from 400 to 500 acres between the towns of Milpitas and Palo Alto in the San Francisco Bay region.

Two varieties are mainly grown, the Utah type which is a green variety and the Golden Self-blanching tall type which is a white variety. The Utah type seems to be favored most by the growers, as it yields more, grows well in cool weather, and is probably more resistant to the celery mosaic disease.

This disease is the worst trouble confronting growers. Like other virus diseases of its type, it is carried by insects such as aphids and leafhoppers which are prevalent in celery fields. Infected plants are either completely stunted or develop poor heads. Proper dusting and spraying operations to reduce the insect population are the methods currently recommended for checking the disease. Because of cooler weather conditions prevailing in Santa Clara County, this district may have the advantage of a lesser insect population, but this cannot be depended upon every year. Undoubtedly, mosaic-resistant strains of celery will eventually be developed, as this work is now receiving the attention of plant breeders.

T. Takeda and one of his celery fields ready for winter harvest.

Fine quality makes its own place in any market. Celery that not only "sounds" good but really tastes good as well, finds ready favor. This new celery district is producing excellent quality, and it is not surprising to find the use of fertilizer in these fields well established.

Using plenty of plant food is considered by T. Takeda of Milpitas, California, one of the most important procedures in growing celery. He is the pioneer celery grower of the Santa Clara district and now raises about 50 acres each year.

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The Inquiring Mind *and the* Seeing Eye

By Alister B. Alexander

Madison, Wisconsin

WHEN a man stands apart as a leader, as Wilmon Newell does, it is natural to ask, "What characteristics have placed him in leadership?" Those longest associated with him and who, therefore, have come to know him well, realize that while in emergencies Dr. Newell can and does make decisions quickly, in the ordinary course of affairs he reaches them only after painstaking study of problems in all their bearings. When decisions are reached, he is quick and decisive in putting plans into execution and is unswerving and determined in seeing them through. If the objective is worth while, as it must be, then nothing can stand in the way.

Qualifies as Leader

"Hew to the line and heave through to the finish," would be a good motto to attribute to this leader. Coupled with this attitude Dr. Newell is unsparing of himself, considerate of his associates, and fair-minded in all his relations. He has the ability to choose men, to win their confidence, and hold their loyal support. During the citrus canker campaign the force carried through for months without pay and without any indication that it would be forthcoming. Such esprit de corps is the mark of strong leadership.

In much this manner does H. Harold Hume, Assistant Director of the Florida Experiment Station, pay tribute to his superior officer, Wilmon Newell, who is the subject of our sketch this month.

Protege of Midwest

Wilmon Newell, Dean of the College of Agriculture and Director of the Experiment Station and Agricultural Extension Division of the University of Florida at Gainesville, was born at Hull, Iowa, on March 4, 1878, the son of William J. and Elizabeth A. Newell. After his preliminary education, he entered Iowa State College, where he was graduated in 1897, and from which he later received his Master's degree in 1899, and his Doctor's degree in 1920. After his graduation in 1897, he remained at the Iowa Experiment Station as assistant entomologist until 1899. In that year he went to the Ohio Experiment Station, where he remained until 1902.

During the following year he acted as state entomologist of Georgia, and then began a series of moves which have made him an outstanding figure in the agriculture of the South. From 1904 to 1910 Doctor Newell was entomologist for the Louisiana Agricultural Experiment Station and secretary and entomologist for the State Crop Pest Commission. He then became entomologist at the

Texas Agricultural Experiment Station and acted as state entomologist until 1915. In 1907 Wilmon Newell was married to Helen M. Mabee, daughter of Dr. and Mrs. O. P. Mabee of Galesburg, Illinois.

In 1915 Dr. Newell went to Florida as Plant Commissioner for the Florida State Plant Board, and became Dean of the College of Agriculture and Director of the Experiment Station in 1921, where we hope

DR. WILMON NEWELL

he will continue to serve for many more years. In the spring of 1915 the legislature of the state had passed the horticultural law known as the Florida Plant Act, and it was to accept a responsibility in carrying out that law that Dr. Newell moved there from Louisiana in the fall.

Florida at that time was experiencing serious outbreaks of citrus canker, probably introduced into the Gulf States, prior to 1912, by nursery stock imported from Japan. These outbreaks were serious during 1914, and within a year fruit growers and agricultural workers realized that they were dealing with a new and destructive menace, for which no remedial measure was known. Inability of private interests to properly cope with citrus canker soon became evident, and activity on the part of the state and federal governments became imperative, in order to secure destruction of all affected plants. Authority for the needed steps was sought from the Florida legislature and granted in the 1915 Plant Act. Membership of the State Plant Board was made the same as that of the Board of Control. When this board met to choose a chief administrative official, the qualifications of Dr. Newell were found to be outstanding, and he was charged with the duty of eradicating the serious pest.

Plant disease and pest control methods had not been developed to a high degree of efficiency at that time, and few advocates of eradication as the most economical and effective means were found. Dr. Newell immediately took charge of the work. Progress was slight until 1917, when an appreciable improvement in conditions was noted. The situation grew even better in 1918, 1919, and 1920, and then an increased number of infections appeared during the end of the period. A persistent recurrence took place in 1922 and 1923, and a less severe revival was recorded in 1927. Since that time, however, not a single canker-infested tree has been discovered, and in due time the menace was officially reported to have been eradicated from Florida.

Chosen Dean and Director

Confidence in the ability and the capacity of Dr. Newell grew. When the Board of Control and the Plant Board were called upon, in 1921, to choose a new dean of the College of Agriculture, who also acts as Director of the Experiment Station, they chose Wilmon Newell; but arrange-

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Two Bolls Where One Grew Before

By G. A. Hale

Assistant Agronomist, Georgia Experiment Station

WITH a large carry-over and compulsory reduction in cotton production, it may seem paradoxical to some to find anyone who thinks cotton growers ought to strive to make two bolls grow where only one grew before or to increase individual output by increasing yields and by the use of modern machinery. Nevertheless, these things would prove to be very profitable on many farms as no satisfactory substitute has, as yet, been found for individual efficiency in lowering costs, increasing output, and improving the quality of American cotton.

Those familiar with our common methods of cotton growing are impressed by the lack of application of modern science and art to field practices. Just why cotton farmers are not farming in the light of present-day information and equipment and how to reform them are beyond the scope of this discussion. However, an attempt will be made to supply some more "light" with the hope that those who read may run into some useful information.

In all but the extreme western part of our cotton belt, commercial fertilizers of the right kind and amount in the hands of otherwise efficient farmers can usually be made to return a profit of from one to four dollars on every dollar invested.

Getting hold of the right amount and kind of fertilizer or "guano" for

Typical scene in the "fertilizer belt." The cotton planter follows the fertilizer distributor, and one-mule implements predominate.

a given field is complicated by both agronomic and economic considerations. The cotton-belt experiment stations recommend various kinds and amounts for the many soil types of this section. The most common amounts and kinds advised are approximately 200 pounds of 16 per cent superphosphate, 200 pounds of nitrate of soda or an equivalent amount of inorganic nitrogen from other nitrogenous materials, and 32 pounds of muriate of potash or an equivalent amount of potash in other sources, for each acre of cotton. For the sandy lands of the lower cotton belt, generally 64 or more pounds of muriate of potash are recommended. Potash is effective in reducing wilt and cotton rust damage on these soils.

Most cotton fertilizer experiments are conducted on the same land every year. Where cotton is grown in a rotation with legume crops, as is often the custom during recent years, it is likely that less nitrogen and more phosphates and potash could be profitably used on the cotton.

In recent years much attention has been given to the time of application and the placement of cotton fertilizers in the row. The results are in favor of either putting out the fertilizer several days or weeks before planting or separating the seed from it so as to avoid fertilizer injury. The "hitch" in these recommendations is that farmers are usually too busy with spring planting operations to make separate operations of fertilizing and planting and that no cheap and efficient combination distributor and cotton planter is on the market.

About as much experimental work has been done in cotton breeding and variety testing as in fertilization. Cotton varieties are generally classified according to their staple length. Breeders and growers are divided on the importance of staple length. One group thinks that American growers should improve the quality of their crop by planting longer staple cottons regardless of production cost and consumer demand factors, while another group advocates growing short staple or any other varieties that make high yields and have low growing costs. Space will not allow a discussion of these two cotton varietal "philosophies."

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Mississippi Delta planters are using modern cotton machinery in order to make cotton production cheaper.

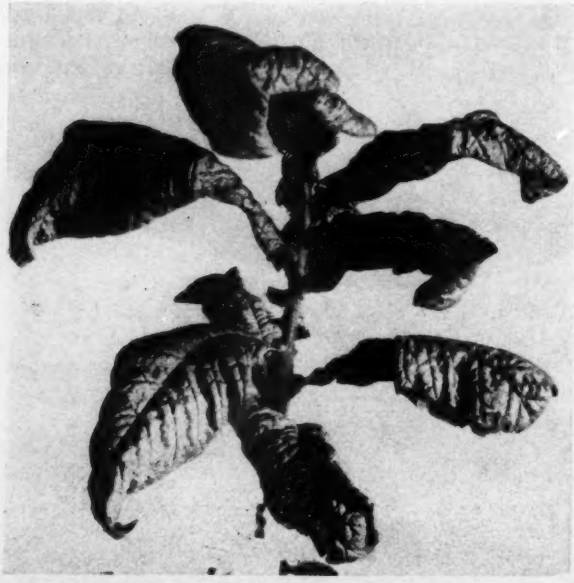
Profit Factors *in* Flue-Cured Tobacco

By J. M. Carr

Tobacco Specialist, Georgia Coastal Plain Experiment Station

WITHIN certain limits, the profit from most farm crops depends largely upon the yield per acre. This is only logical because there are certain fixed production costs, and quality usually improves with high yields. In the production of flue-cured tobacco, or tobacco of any kind for that matter, the profit per acre depends entirely upon the proper combination of yield and quality. Quality has no direct relation to yield except in the two extreme limits. Very low yields result in small, short leaves and are undesirable, while excessively high yields are made up of heavy, coarse leaves with large fibers. There is little demand for either type. In the study of the nutritional requirements of the tobacco plant from the standpoint of producing flue-cured tobacco, practically all of our effort has been directed toward producing the most profitable combination of yield and quality.

To state that highly productive soils are not desirable for a crop will no doubt shock those who are not familiar with the production of flue-cured tobacco. However, it is true that soils that will produce high yields of corn, cotton, oats, hay, legumes, or other crops without heavy applications of commercial fertilizers will not produce profitable crops of flue-cured tobacco. Such soils grow the plant too large and coarse for fine quality.



Chlorosis or mottling, indicating potash starvation, begins at the leaf tip. Leaves curling under and localized dying of the tissue distinguish symptoms of potash deficiency from those of magnesia deficiency or sand drown.

In order to produce fine quality it is necessary that the plant be fed a definite and known ration in much the same manner that high producing animals are fed. To avoid the unknown, only soils

low in natural fertility but of good physical qualities should be used. Such soils are the soft, friable, sandy loams that have good water-holding capacities and yet warm up quickly in the spring. Thus by avoiding the unknown reserve of heavy soils and using a known plant food, it is possible to govern the size of growth, maturity date, and quality of plant quite definitely. Of course, seasons are an uncontrollable factor and often confuse or completely upset our attempt to control the plant.

Fertilizer, well-balanced for the need of the crop, made profit in this field of bright tobacco.

Normally, growth of the tobacco plant under favorable conditions is rapid. The first harvesting can often be made approximately 60 days after transplanting, and almost invariably the crops that are produced in the shortest time are the most profitable. It should be stated, however, that the amount and distribution of rainfall during the growing season are the most important factors involved in early maturity.

In order to mature the crop in such a short time, the plant food applied must be in quantities and forms conducive to maximum growth without impairing the quality. The nitrogen must be limited to approximately 30 pounds per acre. One-third of this amount should be derived from inorganic nitrate nitrogen materials, or, instead of using the materials containing inorganic ammonia nitrogen, those containing nitrogen in the nitrate form may be used for two-thirds of the total nitrogen. These forms of nitrogen promote a quick start and rapid growth. The remaining third of the nitrogen supply should be derived from high-grade organic materials of plant or animal origin, such as fish scrap, cottonseed meal, and animal tankage. The organic nitrogen thus supplied helps to some extent in preventing leaching from excessive rains early in the season and also gives the mixed fertilizer the desired physical properties.

Phosphorus should be applied at rates of from 80 to 100 pounds per acre. Experiments show that 40 pounds P_2O_5 per acre will produce approximately the same yields as the 80 to 100-pound applications. However, the additional 40 to 60 pounds per acre are required to bring out quality. Superphosphate, dicalcium phosphate, and triple superphosphate are suitable sources of phosphate. Where the triple superphosphate is used, the calcium requirements of the plant must be considered.

The maximum amount of potash that may profitably be used on the Coastal Plain soils has not been determined. Experiments show that applications as high as 80 pounds K_2O per acre are profitable. It is entirely possible that even heavier applications

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Alfalfa removes large quantities of potash from the soil. The field above received no potash.

A Legume Program *for* Sandy Soils

By C. E. Millar

Head of Department of Soils, Michigan State College of Agriculture

A CROPPING system which is not designed to improve the soil is almost certain to lead to soil depletion. There seems no middle ground. Crops selected because they will withstand mediocre soil conditions will be replaced shortly by crops which are adapted to yet poorer soils, and so the road to ruin is followed. The avoidance of soil-improving crops because they have rather exacting soil requirements is the first step toward soil abandonment.

Legumes require suitable soil condition for satisfactory growth. They are among the most critical of soil conditions of any of our common crops and yet they are the keystone to the soil-building program on a large acreage of Michigan sandy soils. It is difficult to find an outstandingly successful farmer on the lighter soils of our state who is not an ardent advocate of legumes and who does not attribute much of his success to his soil improvement program based on an adequate acreage of alfalfa, and the clovers.

Crop growth is limited on a large share of our sandy soils because of an insufficient supply of organic matter. The increase or even the maintenance of the supply of organic matter in the sandy and light loam soils is one of the most perplexing problems confronting farmers managing these lands. A scientific principle involved in the accumulation of soil humus requires that there must be one pound of nitrogen for every ten or twelve

Note the stimulation to growth which potash, supplied in commercial fertilizer, gave this alfalfa.

pounds of carbon. If this relation does not pertain, there will be a rapid dissipation of the carbon through decay processes, and the quantity of organic matter in the soil will be reduced in proportion. Nitrogen is the key element in humus accumulation, it is evident. Legumes are our only crops which have access to the unlimited store of nitrogen in the air. By means of the bacteria in the nodules on the roots of inoculated legumes, nitrogen from the soil air is combined into products which become food for the plants. Thus nitrogen is obtained free of cost and is built into the hay in the form of valuable protein for stock feeding, and into the roots and stubble where it increases the quantity of humus produced as the plant tissue decays. The manure produced from feeding the hay may also contribute liberally to the humus supply of the soil if it be carefully handled around the barn so as not to lose the valuable nitrogen extracted from the air by the nodule bacteria.

The value of legumes in building up the organic content of the soil is not limited to their nitrogen-acquiring ability. The root systems of alfalfa and the clovers fill the soil with small fibrous roots forming a dense sod, even though the alfalfa does produce a top root. It has long been known that crops which produce sods are superior to others in their humus-accumulating capacity. As witness of this fact we need only look at the depth and blackness of our prairie soils.

The value of legumes in increasing yields of crops which follow in the rotation and in contributing toward maintenance of soil fertility has been emphasized so frequently in writing and observed so universally by farmers that nothing further on the subject need be said here aside from pointing out that an effort to farm sandy soils without the growing of a high legume acreage goes beyond the realm of optimism. From our 20 years experimental experience in the management of sandy soils and observation of the work of many farmers operating on sandy soils extending from the Straits to the southern boundary of Michigan, we feel that putting these soils in condition to grow legumes is the first and most important point in their management.

The close relationship between lime and legumes is quite generally understood but all too frequently ignored by those who fail to plan sufficiently far in advance or those who think that if weather conditions are right

they may get a stand of alfalfa or clover even if the land is sour. Others endeavor to make manure take the place of lime. Fortunately all sandy soils are not sour, and hence it is advisable to test any and every field for lime requirement a year or more before it is to be seeded to alfalfa or clover. This precaution allows of ample time to apply the lime at a convenient time so the soil will be in readiness when the legume is seeded.

Lime is a soil conditioner, and although it does enter into the life processes of the plant, it is not considered a plant food or fertilizer in the same sense as are nitrogen, potash, phosphoric acid, etc. As might be expected, valuable crops like alfalfa and the clovers are rather heavy feeders and are quite particular that their diet be balanced to satisfy their needs. They are like pure-bred livestock in this respect; they will not give their best performance unless they are well fed.

Legumes Need Potash

Recognizing the above facts, we have endeavored to determine through experiments located on farms in various parts of western Michigan, what the sandy and sandy loam soils of our state need to enable them to grow alfalfa luxuriantly. If a need for lime existed, it was supplied first as we soon learned that good weather will not correct soil acidity. A study of the chemical composition of alfalfa, clover, and sweet clover showed that these plants are unusually rich in potash. Reports of experiments in other states also showed the high potash requirement of these crops, and hence this plant nutrient was given a prominent place in our experimental fertilizer treatments. Results justified this decision, as is illustrated by the following observation.

A sandy loam soil in southwestern Michigan produced no alfalfa without lime. An application of limestone without fertilizer resulted in a yield of 2,266 pounds of hay as an average for five crops. The addition of 100 pounds of muriate of potash on the limed soil increased the average yield to 3,014 pounds of hay.

Phosphoric Acid and Lime

As alfalfa also has a rather heavy requirement for phosphoric acid, in many trials this plant food was used in conjunction with potash. The increased growth of alfalfa resulting from addition of phosphate fertilizers on soils having insufficient supply of this plant food is illustrated by the following results from tests on a Fox sandy loam soil in Kalamazoo County. Limestone increased the yield from zero to 2,333 pounds of hay as a 12-year average. Phosphate fertilizer at the rate of 200 pounds of 0-20-0, applied three times in the 12-year period, increased the average yield to 3,003 pounds. When this plant food was supplemented with three 100-pound applications of muriate of potash, the yield rose to 3,364 pounds of hay.

A summation of results of experiments on the sandy loam soils of western Michigan has led to the conclusion that potash and phosphoric acid should be used in approximately equal proportion for best results in the fertilization of alfalfa. The same would be true for sweet clover and red or "June clover" as it is called locally. This relationship is illustrated by a yield of 2,579 pounds of hay with phosphate alone, 3,389 pounds with about 1/3 as much potash as phosphoric acid, and 3,805 pounds of hay when potash and phosphoric acid were used in about equal quantities. These figures suggest that 0-12-12, 0-20-20, and similar fertilizer analysis be used on soils falling in the better sandy loam group.

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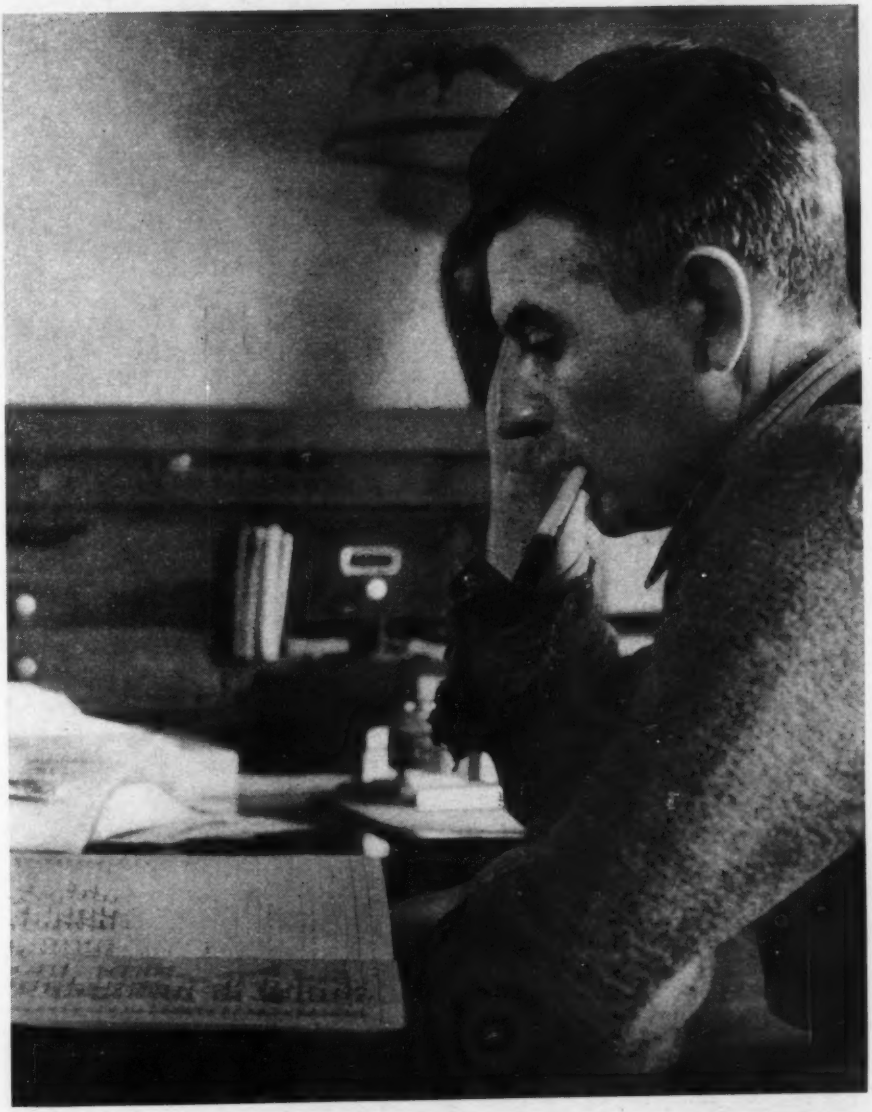
Pictorial



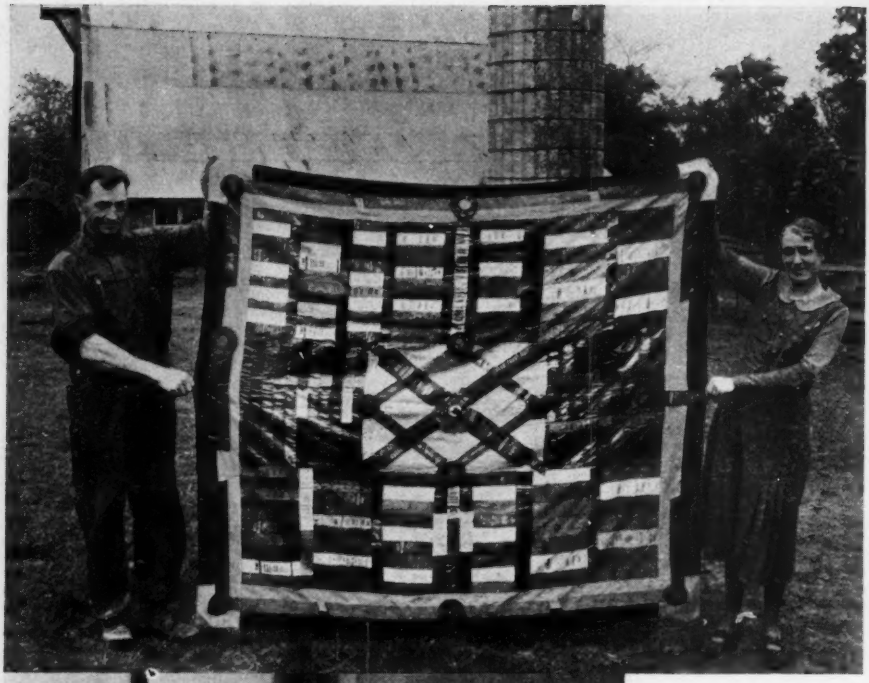
"I'VE GOT TO ALLOW FOR THE COST OF FERTILIZER."

The attraction of a good farm auction isn't lessened by cold weather.

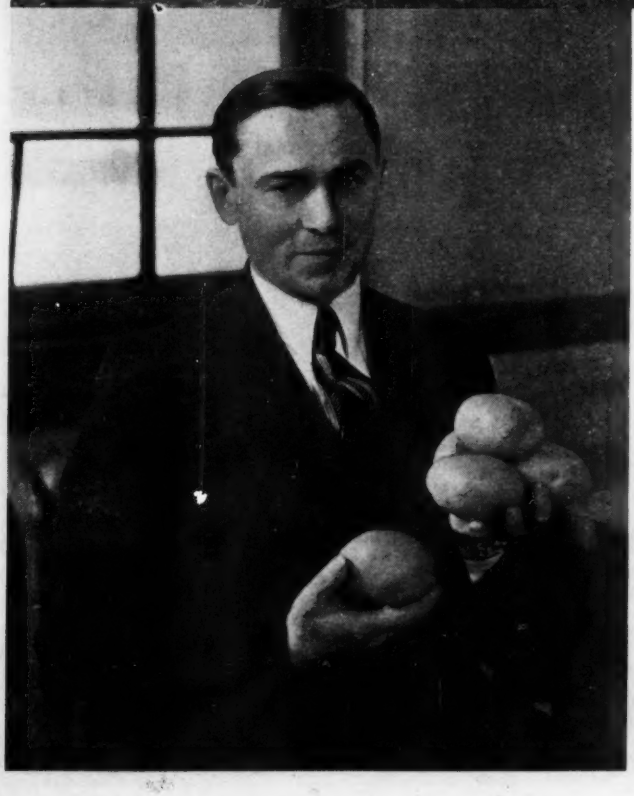
Left: Sound young horses are demanding good prices.

Right: Many farm women make money with poultry.

An important part of the winter farm ritual is butchering hogs.



Mr. and Mrs. C. E. Newson of Worthington, Indiana, have put their honors to practical use. They are exhibiting a quilt made from the ribbons won by their Jersey cattle.



Left: Perry E. Ort, Churubusco, Indiana, is Hoosierdom's 1935 Potato King. He won the 400-bushel contest with a yield of 486.9 bushels of U. S. No. 1 grade potatoes per acre. Certified Irish Cobblers were planted, and the fertilizer was 500 lbs. of 0-12-37 per acre. Cultivation was shallow, and the crop was sprayed four times with Bordeaux.

The Editors Talk

Exporting Soil Fertility

At no previous time in American history has so much been said, written, and done about soil fertility, its restoration and conservation as the nation's most important asset. At no previous time has it become a national issue, accepted as such by the American people as a whole, from the President down through the various Federal, State, and industrial authorities, to the man in the field.

The President in his statement, "We must avoid any national agricultural policy that would result in shipping our soil fertility to foreign nations," expresses an aspiration as well as a national necessity far transcending the meaning at first glance conveyed by this brief sentence. Literally, as American agriculture long has been and still is being practiced today, soil fertility is being shipped "abroad" wherever the crop is removed from the field where grown. The farmer's barn too often is synonymous with "foreign nations," for even the soil fertility in harvested crops stored in barns in too many instances never finds its way back to the soil from which it came.

Unless we adopt the type of soil fertility conservation that has maintained Chinese agriculture for 5,000 years, which we never will, our soil fertility will continue to be "exported"—a fact so obvious and inevitable as to give emphasis to this highly significant statement descriptive of a situation which actually exists. The nation's attention has been pointedly drawn to the remedy which it clearly connotes, namely, that of putting back onto the land the soil fertility which has been and is being "shipped" away, not only by the crop but likewise by leaching, soil erosion, and other avoidable and unavoidable natural and artificial agencies.

The cause of this situation is described in a few words by Dr. R. G. Tugwell in his testimony before the Special Senate Committee on Survey of Land and Water Policies of the United States wherein he said: "Vast areas of land which had been used sometimes for half a century . . . were becoming exhausted, sometimes through improper use. . . . Thereby, through erosion, exhaustion of fertility . . . much of this land had, so to speak, economically gone out from under the people that were on it."

Information on how to restore soil fertility antedates by many years any nation-wide realization of its immediate need. For many years the agricultural scientist has taught, and is still teaching by all the educational facilities at his command, the necessity of restoring soil fertility, and its impending alternative, soil exhaustion. Former generations of farmers have passed on to the present the task of putting back into the soil, as nitrate, phosphate, potash, lime, and magnesia now fortunately obtainable at lower prices and in more scientific mixtures than at any previous time in agricultural history, something more than a mere fraction of the soil fertility removed with their crops, never to return—"shipped to foreign nations."

Dr. N. A. Pettinger

On February 1, soil science lost one of its prominent and well-known workers. Dr. Nicholas Albert Pettinger passed away at his home in Blacksburg, Virginia. A victim of a long illness, his indomitable will to achieve and to render a service to American agriculture spurred this young research worker to the recognition he attained in the comparatively short span of his life.

Dr. Pettinger was born in 1901, a native of Iowa. He received his education in institutions of that state and Illinois. At the experiment station of Illinois, he worked for two years after receiving his Ph.D. degree. In 1927 he joined the staff of the Virginia Agricultural Experiment Station as Assistant Professor and Associate Agronomist, in which capacity he was serving at the time of his untimely death.

In 1934 when the American Society of Agronomy enlarged its committee on fertilizers and appointed three sub-committees—one on fertilizer application, a second to study acidity and basicity, and a third to study rapid chemical methods for determining plant-food deficiencies—Dr. Pettinger was chosen as chairman of the latter committee. He made many contributions to the scientific literature, especially on the subject of fertilizers and plant-food deficiency symptoms. He was an active worker in the field of rapid chemical methods. His efforts from the first were directed at the application of these methods to diagnosis of fertility needs of soils and the development of research that would make possible a better correlation of these tests with crops and soils.

It is workers of the sincerity and industry of Dr. Pettinger which American agriculture can ill afford to lose.

Practical Application

Every-day use of a land survey project made under the direction of the Federal Emergency Relief Administration is seen in a report issued by the South Carolina Agricultural Experiment Station. Soil acidity prevailing on farms in the various parts of the state was determined in connection with the land-use survey. Based on the condition of the soil with respect to acidity and general fertility as determined by observation and previous treatment, H. P. Cooper, Professor of Agronomy, makes recommendations for various crops, not only for the amount of lime to be used, but also for the proper fertilizer to accompany the liming to produce a profitable crop.

This type of work is an example of the practical application of funds and man-power for the accumulation of data and information of immediate value to farmers and of permanent value to investigators in enabling them to make more accurate recommendations to farmers in the future.

Post Card

Please be sure to fill out and return the postal card enclosed in this issue. We are very anxious to have this information in order to check and reclassify our mailing list. Your cooperation and courtesy in this instance will be greatly appreciated.

REVIEWS

This section contains a short review of some of the most practical and important bulletins, and lists all recent publications of the United States Department of Agriculture and the State Experiment Stations relating to Fertilizers, Soils, Crops, and Economics. A file of this department of BETTER CROPS WITH PLANT FOOD would provide a complete index covering all publications from these sources on the particular subjects named.

Fertilizers

The Pennsylvania School of Agriculture and Experiment Station, in cooperation with the Bureau of Plant Industry of the United States Department of Agriculture, presents a preliminary report on the effect of different fertilizer treatments on pasture grasses in Bulletin 323, entitled "Pasture Fertilization," by F. D. Gardner et al. While definite conclusions are not yet drawn from the tests, results indicate that a substantial increase in value of hay over fertilizer cost is obtained from applications of limestone sufficient to neutralize soil acidity, 64 pounds of phosphoric acid, 50 pounds of potash, and 48 pounds of nitrogen per acre. Other interesting results determined from grazing investigations, according to the authors, show the average cow will graze at least 60 pounds of pasture grass in a day, which represents about 11.4 pounds of total digestible nutrients, or a total of 342 pounds in one month. The cost of the nutrients as a result of pasture grazing is estimated to be 58 cents per 100 pounds. Comparing these values with mixed hay costing approximately $14 per ton and supplying total digestible nutrients at a cost of $1.52 per 100 pounds, the nutrients in the mixed hay cost 2.6 times as much as the pasture grass.

A mass of instructive information is contained in Bulletin 375, of the Maryland University Agricultural Experiment Station, on the nutritional responses of the tomato plant, by Paul Lewis Fisher. As suggested by the title, "Responses of the Tomato in Solution Cultures with Deficiencies and Excesses of Certain Essential Elements," the investigations should prove very valuable in solving many pertinent problems concerning fertilizer practices on this crop. Quoted in the introduction is a significant statement from McMurtrey's work on the effects of the deficiencies of certain elements on the growth of tobacco: "Once the distinctive symptoms of the deficiency of each element are known for one plant species, such as the tobacco plant, their recognition in other plants will be relatively simple. Although there may be minor variations in the symptoms shown by different plant species, the characteristic effects are likely to be essentially the same."

When the Marglobe variety of tomato plants was grown in solutions deficient in any one of the essential elements, as boron, calcium, magnesium, potassium, nitrogen, phosphorus, and sulphur, there was a decrease in plant growth, the publication shows. With the exceptions of calcium, nitrogen, and sulphur, these studies reveal a beneficial response was prevalent when concentrations double that of the control cultures were used. Excellent photographs illustrating the response of the nutrient treatments to tomatoes are contained in the bulletin.

Very interesting results from fertilizer experiments on cotton are compiled in the "Forty-seventh An-

nual Report of the Georgia Experiment Station," by Director H. P. Stuckey. The most profitable yields of cotton under present conditions are secured by applying 32 pounds each of nitrogen, phosphoric acid, and potash per acre. Additional field tests with 24 farmers located in different sections of the state to check these results showed that cotton fertilized according to the Station's plan made an average yield of 221 pounds of seed cotton more than that produced on plots using the farmers' plan, or a net profit of $6.84 per acre. In other cotton fertilizer experiments, results show the value of the minor elements applied to cotton on various soils in the state. It is disclosed that substantial increases in seed cotton are generally produced from the use of magnesium, with the exception of the Coastal Plain soils at Fort Valley and Carnegia. Small amounts of boron on cotton in some instances resulted in small increases, in others, decreases in yield. Investigations on sources of phosphate and nitrogen for cotton, and the use of limestone with acid-forming nitrogen in cotton fertilizers are also discussed in the report. Descriptions of many other projects, too numerous to mention here, indicate the wide range of agricultural investigations being carried on by the experiment station in this state.

"Commercial Fertilizers Report For 1935," Agr. Exp. Sta., New Haven, Conn., Bul. 377, Oct. 1935, William L. Slate, Director.

"Fertilizer, Lime, Feed, and Seed Report, Jan.-June, 1935," State Board of Agr., Dover, Del., Quarterly Bul., Vol. 25, No. 2, September, 1935.

"Manure Increases Farm Income," Agr. Exp. Sta., Lafayette, Ind., Bul. 398, Mar. 1935, A. T. Wiancko, G. P. Walker, and R. R. Mulvey.

"Rates of Solution and Movement of Different Fertilizers in the Soil and the Effects of the Fertilizers on the Germination and Root Development of Beans," N. Y. Agr. Exp. Sta., Geneva, N. Y., Tech. Bul. 231, Aug. 1935, Charles B. Sayre and Arthur W. Clark.

"Some Physiological Studies with Calcium Cyanamide and Certain of Its Decomposition Products," Agr. Exp. Sta., Wooster, Ohio, Bul. 555, Oct. 1935, R. M. Smock.

"The Reaction of Certain Ornamental Trees and Shrubs to Liming," Agr. Exp. Sta., Kingston, R. I., Bul. 250, Aug. 1935, T. E. Odland, H. F. A. North, and G. B. Durham.

"A Comparative Test of Different Bedding Materials and Chemical Supplements with Cow Manure Applied in a Three-year Rotation," Agr. Exp. Sta., Kingston, R. I., Bul. 251, Aug. 1935, T. E. Odland and H. C. Knoblauch.

"Economical Amounts of Nitrate of Soda to Apply in the Greenhouse for the Growth of Tomatoes," Agr. Exp. Sta., Kingston, R. I., Bul. 252, Aug. 1935, Basil E. Gilbert and Frederick R. Pember.

"Availability of Nitrous Nitrogen to Plants," Agr. Exp. Sta., College Station, Brazos County, Texas, Bul. 515, Oct. 1935, A. B. Conner, Director.

Soils

Quarterly Bulletin 58, Panhandle Agricultural Experiment Station of Oklahoma, "Calculated Net Income Resulting from Level Terraces on Richfield Silt Loam Soil and Suggested Lines of Defense Against Wind Erosion," by Harley A. Daniel, depicts data of much importance to that area as a result of terrace studies on this type of soil. Terraces placed about 35 feet apart on land of about one per cent slope were found to be most efficient from the standpoint of crop production. Grain tests on terraced and unterraced land conducted from 1926 to 1935, inclusive, show an average of 3.1 bushels more harvested annually from the terraced when compared with yields obtained from the adjacent unterraced area. The average cost of constructing broadbase terraces is 77 cents per acre, not including labor. It is estimated 20 to 50 cents represent the extra cost per acre to cultivate the terraced and contoured land. Deducting the total expenditure from the net income, terrace returns amount to $1.75 per acre, the report announces. Suggested defense against wind erosion is also discussed.

"A Critical Study of the Methods for Measuring Oxidation-Reduction Potentials of Soils, with Special Reference to Orchard Soils," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y., Bul. 625, Mar. 1935, Michael Peech and L. P. Batjer.

"Drainage of Land Overlying an Artesian Groundwater Reservoir," Final Report, Agr. Exp. Sta., Logan, Utah, Bul. 259, Nov. 1935, O. W. Israelsen and W. W. McLaughlin.

"Soil Survey of the Longmont Area, Colorado," U. S. D. A., Washington, D. C., Series 1930, No. 29, A. T. Sweet and C. H. Dodson.

"Soil Survey of Marion County, Kansas," U. S. D. A., Washington, D. C., Series 1930, No. 35, E. W. Knobel and R. O. Lewis.

"Soil Survey of Polk County, Texas," U. S. D. A., Washington, D. C., Series 1930, No. 36, H. M. Smith, T. C. Reitch, Harvey Oakes, L. G. Ragsdale, and A. H. Bean.

"Soil Survey of Crawford County, Wisconsin," U. S. D. A., Washington, D. C., Series 1930, No. 34, M. J. Edwards, W. J. Geib, Olaf Larson, D. E. Wilcox, and E. H. Tyner.

Crops

Many helpful suggestions on methods for combating the ever-menacing effects of soil erosion are given by the Tennessee Agricultural Extension Service Publication 188 entitled, "Winter Cover Crops for Pasture and Soil Conservation." Tabulated in the report are alarming statistics relative to the vast devastation caused by erosion in that state alone. Through erosion at least 126,000,000,000 pounds of plant-food elements are removed from the crop or pasture land in the United States each year. The value of the nitrogen, phosphoric acid, and potash lost through erosion is estimated at $2,000,000,000 annually. Although terracing alone materially assists in reducing sheet washing, checks head erosion (gully washing), and conserves soil moisture for plant growth, it is not an adequate prevention for erosion. Complete protection is best accomplished by having "A Growing Winter Cover Crop on Every Acre," which has been suggested as a practical slogan for Tennessee farmers. An instructive chart showing the kind of cover crop recommended, date and rate of seeding, seeding requirements, and crop uses is presented in this publication. The value of winter cover crops is expressed in terms not only of preserving the soil and its plant food but of providing winter pasture which reduces the cost of livestock maintenance.

Chief among the outstanding publications of recent release which we list under this heading is the "Report of the Secretary of Agriculture for 1935." Some of the highly interesting subjects treated in this report include: Farm Recovery Aiding General Recovery; Foreign Trade and Its Alternatives; Farm Income; Rural-Urban Balance; Land Utilization; Soil Conservation; Economic Research and Service; and general discussions of the various farm crops typical to American Agriculture. Scientific research, Secretary Wallace asserts, is the principal function of the Department of Agriculture. "All its other activities, such as weather and crop reporting, the eradication or control of plant and animal diseases and pests, the administration of regulatory laws, highway construction, and economic guidance, are the practical expression of research results," the Secretary states. The importance of agricultural research by the state agricultural experiment stations and land-grant colleges is stressed from the standpoint of contributing to social welfare.

"Chemical Investigations of the Tobacco Plant. Part V. Chemical Changes That Occur During Growth," Agr. Exp. Sta., New Haven, Conn., Bul. 374, Sept. 1935, Hubert B. Vickery, George W. Pucher, Charles S. Leavenworth, and Alfred J. Wakeman.

"Soybean Production in Idaho," Univ. of Idaho, Col. of Agr., Moscow, Idaho, Bul. 218, Sept. 1935, H. W. Hulbert and H. L. Spence.

"Pasture Improvement in Indiana," Purdue Univ. Ext. Serv., Lafayette, Ind., Ext. Bul. 205, Apr. 1935, K. E. Beeson and M. O. Pence.

"The Passing of A Decade—A Summary of Extension Activities in Maryland, 1924-1934," Univ. of Md. Ext. Serv., College Park, Md., Thomas B. Symons, Director.

"Physiological Studies on the Pathogenicity of Fusarium lycopersici Sacc. for the Tomato Plant," Agr. Exp. Sta., College Park, Md., Bul. 374, Apr. 1935, Paul Lewis Fisher.

"Forest Planting on Michigan Farms," Mich. State Col., Ext. Div., East Lansing, Mich., Ext. Bul. 147, Oct. 1935, R. H. Westveld and J. L. Van Camp.

"Pruning Young Fruit Trees," Mich. State Col., Ext. Div., East Lansing, Mich., Ext. Bul. 148, Oct. 1935, Roy E. Marshall, H. A. Cardinell, and H. D. Hootman.

"Moisture Movement in Coniferous Wood Below the Fiber-Saturation Point," Agr. Exp. Sta., University Farm, St. Paul, Minn., Tech. Bul. 108, Sept. 1935. Stanley J. Buckman and Louis W. Rees.

"Winter Cover Crops in New Jersey," State Col. of Agr., Ext. Serv., New Brunswick, N. J., Ext. Bul. 165, Sept. 1935, H. R. Cox.

"A Summary of Linkage Studies in Maize," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y., Memoir 180, June 1935, R. A. Emerson, G. W. Beadle, and A. C. Fraser.

"Combinations of Corn and Soybeans for Silage," Cornell Univ. Agr. Exp. Sta., Ithaca, N. Y., Bul. 634, June 1935, R. G. Wiggans.

"A Survey of the Behavior of Cherry Trees in the Hudson River Valley with Particular Reference to Losses from Winter Killing and Other Causes," N. Y. Agr. Exp. Sta., Geneva, N. Y., Bul. 653, July 1935. L. C. Anderson.

"The Bimonthly Bulletin," Agr. Exp. Sta., Wooster, Ohio, Vol. XX, No. 177, Nov.-Dec. 1935.

"The Panhandle Bulletin," Agr. Exp. Sta., Goodwell, Okla., No. 57, June 1935, Harley A. Daniel.

"Forty-eighth Annual Report of the Pennsylvania Agricultural Experiment Station for the Fiscal Year Ended June 30, 1935," Agr. Exp. Sta., State College, Pa., Bul. 320, July 1935, R. L. Watts, Director.

"Pastures, Old and New," Agr. Ext. Serv., State College, Pa., Ext. Cir. 154, June 1934, J. B. R. Dickey.

"Transactions of the Peninsular Horticultural Society, 1934," State Board of Agr., Dover, Del., Vol. 24, No. 6.

"Fall Grain on Lespedeza Sod," Agr. Ext. Serv., Knoxville, Tenn., Ext. Pub. 189, Aug. 1935.

"Alfalfa-Seed Investigations in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 258, Nov. 1935, John W. Carlson.

"Oat Varietal Tests in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 260, Nov. 1935, R. W. Woodward and D. C. Tingey.

"Barley Varietal Tests in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 261, Nov. 1935, R. W. Woodward and D. C. Tingey.

"Comparative Yields of Spring Wheat Varieties in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 262, Nov. 1935, D. C. Tingey and R. W. Woodward.

"Relative Production of Feed Grain from Spring-Grown Cereals in Utah," Agr. Exp. Sta., Logan, Utah, Bul. 263, Nov. 1935, R. W. Woodward and D. C. Tingey.

"Relief Wheat," Agr. Exp. Sta., Logan, Utah, Bul. 264, Nov. 1935, D. C. Tingey and R. W. Woodward.

"Apple Orcharding. Winter Injuries; Grass Endurance; Irrigation and Nitrate; Twenty-sixth to Thirtieth Year of a 14-Variety Orchard," Agr. Exp. Sta., Burlington, Vt., Bul. 395, July 1935, M. B. Cummings, E. W. Jenkins, and R. G. Dunning.

"Department of Agriculture-Immigration of Virginia," Richmond, Va., Bul. 333, Dec. 1935.

"Report of the Chief of the Office of Experiment Stations, for Fiscal Year Ended June 30, 1935," U. S. D. A., Washington, D. C., James T. Jardine, Chief.

Economics

The "Report of the Chief of the Bureau of Agricultural Economics, 1935," portrays many impressive services this department renders. Concerning its functions, Chief A. G. Black remarks that "Not only has there been an increased load of special tasks, but the regular work of the Bureau—fact finding, analysis, administration in marketing, and like activities—has expanded." The work in the field of land economics has served a basis for administrative planning of the Nation's land resources, the publication explains. General information regarding the immense news-gathering agency of the Bureau, statistical methods applied to crop and livestock enterprises, outlook reports, crop-grading services, and economic research are a

few prominent subjects comprising the report.

"Part-Time Farming in Connecticut, A Socio-Economic Study of the Lower Naugatuck Valley," Agr. Exp. Sta., Storrs, Conn., Bul. 204, July 1935, L. A. Salter, Jr., and H. D. Darling.

"Marketing Fruits and Vegetables in Connecticut, with Special Reference to the New Haven Market," Agr. Exp. Sta., Storrs, Conn., Bul. 205, Aug. 1935, George B. Clarke.

"Effects of Changing Economic Conditions on Farming in a Good Community in Central Indiana," Agr. Exp. Sta., Lafayette, Ind., Bul. 397, Mar. 1935, E. L. Butz and Lynn Robertson.

"The Agricultural and Industrial Demand for Corn," Agr. Exp. Sta., Ames, Iowa, Bul. 335, Aug. 1935, Geoffrey Shepherd, John J. Dalton, and J. H. Buchanan.

"Index Number of Iowa Farm Products Prices," Agr. Exp. Sta., Ames, Iowa, Bul. 336, Sept. 1935, Gertrude M. Cox.

Every Soil Is Fertile; But Not for All Plants

EVERY soil is fertile. But not for all plants. Ordinarily when a soil is called "fertile" or "unfertile," reference is to crop plants—when as a matter of fact every soil is fertile to some plant. It may be corn, grass, or strawberries. Or again the plant may be cactus, jack pine, or bulrushes.

All land is not fertile, however, as all land does not have soil. Before soil can be formed rocks must be broken down by weathering. The weathered rock is made into soil by living organisms. Each soil has its own characteristics produced by the action of microorganisms. Soils and plants develop together—each influencing the other.

There are thousands of soils, each with its own characteristics developed with and by the native plants. In general, it may be said that each plant attempts to make soil from the weathered rock fertile for itself. Thus each soil is naturally most fertile for those plants most nearly like the plants with which it developed.

There are two ways—fundamental to all agriculture—to have a soil fertile for the crop which it is to produce. Man can change a soil so that it will grow some particular plant. Or, he can choose plants adapted to the soil as it already exists. Those who favor the latter—and newer—method, say it will save much labor that might be wasted upon the former.

One of the "Loose Ends" of Agriculture Is Hay

HAY, in spite of its importance to the farmer, has been referred to as one of the "loose ends" of agriculture because of the slight attention given its improvement in comparison with other important farm crops, says E. O. Pollock, hay specialist of the United States Department of Agriculture.

Losses which come from late cutting and improper curing are very real, even though not as apparent to

the farmer who feeds his hay at home as to the man who makes hay a cash crop.

Early cut, well-cured alfalfa, for example, has a high percentage of leaves and green color. The leaves contain more than two-thirds of the protein of the entire plant. Green color in hay is associated with vitamin A, important in animal maintenance and reproduction. Vitamin A content is greatly reduced when hay is discolored from rain, sun bleach, or improper storage.

Alfalfa leaves left in the sun at the Arizona experiment station for less than 3 hours at noon lost 20 to 33 percent of vitamin A, compared to leaves cured in a ventilated, darkened room. Leaves lying over night lost 75 percent. A further exposure of 4 hours at noon the next day increased the loss to 84 percent. Severely bleached alfalfa exposed for a week to sun and rain lost 94 percent.

Such a prodigal waste, says Mr. Pollock, would not be tolerated in many other crops.

Believe That Potash Acts as Anti-freeze

POTASH in the soil provides an anti-freeze solution for the sap of potato vines, farmers visiting the Northeastern Minnesota Experiment Station at Duluth decided last fall.

They viewed the fertilizer experiments after frost had blackened most of the vines. But they observed that on those plots which had received potash, the vines had been untouched by the frost. The treated plots alternated with those to which no potash had been applied, making the contrast a striking one.

A number of the growers said they had noted the same phenomenon on their home fields. Some thought the fertilized vines had resisted the frost on account of being heavier and stronger. Others suggested the possibility that the potash, held in solution in the sap, had acted like alcohol in the water of an automobile radiator, reducing the freezing point. No records had been kept of the temperature in the potato plots during the night of the frost, so there is no means of knowing what degree of temperature the fertilized vines withstood.

Mark J. Thompson, station superintendent, declined to assign a reason for the difference, to which, however, he had directed attention.—*Geo. W. Kelley, Farm Editor, Duluth Herald, Duluth, Minn.*

Field Crop Values Down

THE value of field crops harvested in Canada during 1935, according to the third estimate of the Dominion Bureau of Statistics, is now placed at $506,613,900 compared with the revised estimate of $549,079,600 for 1934 and $453,598,000 for 1933. The decline in value in 1935 as compared with 1934 is mainly accounted for by the lower prices of coarse grains and forage crops. The total area under principal field crops in 1935 is estimated at 56,923,960 acres compared with

55,990,320 acres in 1934 and 58,533,450 acres in 1933. Most of the increase in crop acreage in 1935 is found in fall wheat, oats, barley, fall rye, alfalfa and grain hay.

For all of Canada the wheat production in 1935 is now estimated at 277,339,000 bushels from 24,115,700 acres, 1,490,000 bushels above production in 1934. The average yield per acre is placed at 11.5 bushels, the same as in the preceding year. Wheat production in the three Prairie Provinces—Manitoba, Saskatchewan and Alberta—is estimated at 259,500,000 bushels compared with 263,800,000 bushels in 1934. The acreage sown to wheat in the Prairie Provinces was 23,293,000 compared with 23,296,000 acres in 1934.

The total value of the 1935 wheat production is estimated at $169,857,000 compared with $169,631,000 in 1934, and the average price received by growers at the point of production was 61 cents per bushel, the same as in the preceding year.

Profit Factors in Flue-Cured Tobacco

(*From page* 19)

would pay. However, we must wait until experiments now being conducted have covered a longer period of time before reaching a definite conclusion.

Until recent years 50 pounds K_2O per acre was, in most instances, the maximum amount applied and was far above the average application. In the last 10 or 12 years there has been a tendency toward the use of heavier applications of potash, which may explain to some extent the definite upward trend in the average yield per acre of flue-cured tobacco in Georgia for the 10-year period from 1921 to 1930 inclusive.

In order to produce both high yields and good quality the potash in tobacco fertilizers should be derived from both sulphate and muriate of potash. Sulphate of potash as the sole source of potash produces a leaf of good burn but lacking in size and elasticity. Muriate of potash used alone as a source of potash supplies too much chlorine. While small quantities of chlorine are beneficial, large quantities produce a poor burning leaf, which cures to a dull, muddy color.

Under limited moisture conditions excess chlorine may also cause a thick, curled, twisted type of leaf growth. The amount of muriate of potash that may be used therefore is limited by the chlorine content of this salt. Since the chlorine content of mixed tobacco fertilizers should be two per cent, the use of muriate of potash is thereby limited to approximately 80 pounds of 50 per cent muriate per ton. The remainder of the potash may be derived from sulphate of potash or sulphate of potash-magnesia.

As previously stated, flue-cured tobacco is grown on soils naturally low in fertility and must be fed artificially, that is, with commercial fertilizers. Experiments have clearly shown that on such soils fertilizers containing only nitrogen, phosphorus, and potash, which constitute what is generally known as a complete fertilizer, are not sufficient for normal growth. In order to prevent nutritional deficiencies, tobacco fertilizers should carry other elements in available forms. Among these magnesium, chlorine, and calcium are known to be important.

Magnesia (MgO) and chlorine should each be contained in tobacco fertilizers to the extent of two per cent of the total mixture. One-half of the former should be water soluble. Magnesia deficiency in the soil expresses itself in a chlorotic condition of the leaves of tobacco plants grown on such soils. The quality of these leaves is very low. While the absence of chlorine does not express itself in any abnormality of growth, the presence of this element seems to increase the water-holding capacity of the plant and results in a more succulent plant of better leaf spread. In the absence of calcium the plant fails to develop normally in the terminal bud. It is therefore necessary that calcium be supplied to the extent of about six per cent of the mixed fertilizer. Excessive quantities of sulphur impair quality by producing dark undesirable colors in the cured leaf, which makes it necessary to reduce to a minimum the sulphur contained in the fertilizers.

Other Important Factors

These complicated recommendations for flue-cured tobacco fertilizers are not caused by freakish demands of this particular plant, but by the type of soil used. No doubt other plants grown on the same depleted soils would show some symptoms of nutritional deficiences if these deficiencies were not supplied by commercial fertilizers.

Flue-cured tobacco is a highly specialized crop, and the profit per acre is doubtlessly more dependent upon the human factor than any other crop grown in the United States. The essence of good management is timeliness and thoroughness of operation.

Tobacco should be transplanted to the field as soon as all danger of frost has disappeared. An abundance of strong, healthy seedlings ready for transplanting at this time is the most important point to be considered in getting the crop started. Late plantings and irregular stands due to poor seedlings are two common causes of failure to produce a profitable crop.

The methods of cultivation used throughout the tobacco belt vary somewhat, but the ridge method is considered the most desirable. This method consists mainly of forcing the soil toward the plant with each cultivation, so that when cultivation is completed the plants will be on a high ridge.

The human factor plays a greater part in harvesting and curing than in any other operations connected with the crop. Many farmers incur losses every year by harvesting the crop too green or waiting until it is over-ripe. Such losses are avoidable. Curing is a rather complicated procedure, and good cures are dependent upon experience and good judgment.

A Legume Program for Sandy Soils

(*From page 22*)

The need for potash is more evident, however, on the more sandy soils and especially on land which has previously grown alfalfa thus reducing the available supply of this plant food. An average of eight crops of sweet clover grown on a light, sandy loam in the northern part of the lower peninsula bears out this observation. This soil was not in need of lime and produced on the average 1,574 pounds of dry sweet clover without fertilizer; 200 pounds of phosphate increased the hay yield to 1,850 pounds. When the need for potash was partially supplied by ap-

plication of 50 pounds of muriate of potash, in addition to the phosphate, the yield jumped to 2,433 pounds. Further additions of potash fertilizer to make the actual potash applied 25 pounds the second. When potash and phosphoric acid were added in equal proportions, the first cutting of hay jumped to 4,640 pounds with an 1,800-pound second cutting. Dry

Sweet clover on sandy loam soil well supplied with lime. Left, fertilized with potash. Right, no fertilizer. Ample potash is essential for satisfactory growth of legumes on the sandy soils of Michigan.

per cent more than the actual phosphoric acid used resulted in 2,753 pounds of hay, while increasing the potash to virtually double the phosphoric acid shoved the hay yield to 3,200 pounds. Experimental results of this kind have induced us to recommend fertilizers such as 0-10-20 and 0-8-24 for alfalfa on the lighter sandy loam soils of the state.

Failing to realize how profitably alfalfa and clover respond to application of the right kind of fertilizer, many farmers seed these crops without addition of commercial plant food. This oversight may be remedied to a considerable extent, though not wholly, by top-dressing the established stand with fertilizer. That such a use of fertilizer is highly advisable is evident from results obtained on a good sandy loam soil in central Kalamazoo County. The alfalfa stand was established on limed soil. The plot receiving phosphate without potash yielded 2,840 pounds of hay the first cutting and 1,040 weather decreased the second cutting very decidedly in this field trial. The fact that phosphate without potash is an unsafe fertilizer for alfalfa on soils of this type is brought out by the fact that the second cutting was much better on the unfertilized land than on that receiving phosphate alone.

Manure Inadequate

The high potash content of manure might suggest it as a suitable fertilizer for legumes on sandy loam soils. This reasoning has not been found sound, however, since manure contains as much nitrogen as potash and inoculated legumes are able to take their nitrogen from the soil air. In fact one of the reasons why legumes are grown is because of their nitrogen-fixing ability through the action of the bacteria living in the nodules on their roots. When supplied with nitrogen by application of manure, the bacteria are not so active in taking nitrogen from the air and hence the

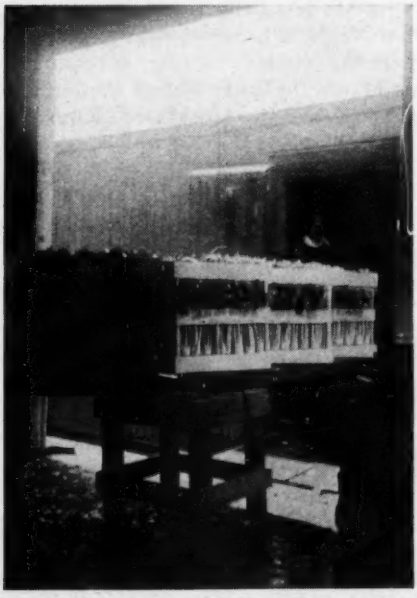
full value of growing the leguminous crop is not realized. Furthermore if properly fertilized with potash and phosphate, our experience shows that the alfalfa will make just as good a growth as if the fertilizer contained nitrogen.

This finding points out that the manure can be used to better advantage for grain crops, which must take all their nutrients from the soil. It is not recommended therefore that manure or commercial nitrogen fertilizer be used for alfalfa. The sandy soil farmer, however, who has discovered that legumes are the key to a fertility-maintaining and successful management program on such soils, and he certainly will find this out if he tries the legume system, should not fail to use fertilizer containing ample potash.

Quality Celery Finds A Market

(*From page* 13)

Mr. Takeda has recently constructed three new greenhouses in which celery and other transplants are grown. Transplanting of celery is started in March and continues to August. This makes a harvesting season from June to December. Before setting the celery plants, an application of manure is worked into the surface soil of the field. Slightly raised beds which are wide enough to carry two rows of celery are then ridged up.



Loadng a car of celery at San Jose Celery Distributors.

After setting the plants, an application of fish meal is distributed between the beds. Later on when growth of the plants is well started, chemical fertilizer is applied between the beds at the rate of 3,000 pounds per acre. This fertilizer is a mixture prepared according to Mr. Takeda's own ideas and includes generous amounts of potash, the total potash used in his fertilizing operations being from 20 to 40 tons each year.

Yields of celery obtained on this farm have been very satisfactory, the Golden tall type producing from 550 to 700 half crates per acre and the Utah type 800 to 1,000 pony crates per acre.

Mr. Takeda has made very careful observations on the effects of potash on his celery crop. He has found that land may be cropped intensively to celery for two years without potash, but after that quality begins to decline seriously. Then potash applications become very necessary and have a great effect on keeping quality.

Fertilizing with potash has enabled the celery to withstand two months of cold storage in excellent condition, whereas one month of cold storage is the usual limit. Observations on how the celery keeps in cold storage definitely indicate to Mr. Takeda the extent of quality troubles and the need for potash.

Analyses of the celery crop seem to justify the important place accorded to potash fertilizer, since these show that this crop requires three times as much potash as nitrogen and four times as much potash as phosphoric acid.

The quality of even the large outer stalks of celery grown on this farm is remarkably fine. These are not "punky" and "stringy," but for their full length are solid and crisp and nearly as tender as the heart.

Mr. Takeda's celery business has developed so satisfactorily that he has his own packing concern, known as San Jose Celery Distributors. Celery is shipped in car lots to all parts of the country, the chief market, however, being in the East. This celery has commanded a premium of 25¢ to 50¢ per create at shipping point, another proof that the quality effects of potash create a market which brings returns in real money.

The Inquiring Mind

(*From page* 15)

ments were made whereby he could also continue as Plant Commissioner for the State Plant Board.

As the principal enforcement officer in the execution of the revised Florida Plant Act, Dr. Newell had full charge of the joint federal and state eradication effort directed toward the Mediterranean fruit fly. While the activities in the warfare on this pest were regulatory in nature and hence fell within the province of the Plant Board, other divisions of the College of Agriculture contributed personnel and cooperated in several lines. Headquarters were established at Orlando, by state and federal specialists, under the direction of Dr. Newell.

Discovery of the Mediterranean fruit fly in Florida took place during April 1929. Quarantine prohibiting the movement of many grove, garden, and field products became effective on May 1. Modifications and amendments to the original quarantine were made at various times during the following year, until it became evident that the danger of spreading no longer existed, and the embargo was lifted in November 1930. A period of only 18 months was required to completely rid the state of the insect, and no cases of reinfestation have been found, although properties on which susceptible fruits and vegetables are raised have been inspected every few months.

Capacity of the fruit fly for rapidly multiplying and spreading is shown by the fact that in the area known to be free from the pest but a few months before, between April 6 and 30, 1929, infection was found on 364 properties in 51 separate localities of 11 counties. Limits of the territory affected were well determined by the middle of the following July, and after the following August no further expansion occurred. A grand total of 1,002 properties, distributed over 20 counties, was found to be infested. Within the boundaries of the section where eradication methods were applied, containing between 15,000 and 16,000 square miles and approximately 10,000,000 acres, were located some 120,000 acres of citrus groves and

about 160,000 acres of other host fruits and susceptible vegetables. Interspersed were vast acreages of unimproved lands, marshes, and swamps, with considerable wild growth attractive to the pest. Natural barriers to the spread in a degree were supplied by the intervening terrain between the lands under cultivation, as this species of fruit fly seldom travels by its own power over long distances.

Eradicated Fruit Fly

Funds expended in the eradication of the Mediterranean fruit fly from Florida amounted to $6,858,636.92, as of December 31, 1930. To appreciate the magnitude of the work of Dr. Newell and his associates, it is only necessary to quote a few of the totals. Man power in labor employed reached a maximum average of 5,647 in August 1929. Field inspectors at one time numbered as high as 750. Research and administrative personnel fluctuated with the demands of the situation and the developments of the outside operations. Equipment of a mechanical character utilized in the undertaking included 187 trucks, 92 tractors, 60 sprayers, 30 stubble shredders, and 19 trailers. District and county headquarters were established as needed. Growers' organizations and civic bodies rendered helpful cooperation in keeping the public informed as to the progress of the effort.

Sentiment in favor of the program was practically unanimous in the beginning. As the necessary restrictions caused inconvenience in increasing volume, dissatisfaction developed. Politicians took advantage of the growing unrest to attempt its capitalization for ulterior purposes. Interests seeking to overthrow the government structure insinuated themselves into the agitation. Complaints and protests grew so pronounced that a sub-committee of the lower house in the United States Congress held hearings at Orlando. Testimony presented therein wholly failed to supply evidence of improper procedure. Appropriations of federal money thereafter authorized on the recommendation of this sub-committee were in excess of $3,200,000.

In all the activities, Dr. Newell was definitely on the firing line and frequently the victim of shots from snipers. In the midst of the most strenuous period, he became seriously ill and retarded his recovery by attention to important essentials from the sickbed. Winning of the fight brought Dr. Newell the plaudits of the plant pest authorities in all civilized countries, and the years since elapsed have given him an even firmer hold on the esteem and respect of intelligent Florida people.

Wilmon Newell is essentially an eradicator. He believes in eradicating pests before they become widespread and cannot be wiped out, rather than waiting until they will have to be controlled with consequent annual expense and trouble to the farmer and grower. His principal accomplishments have been the eradication of the citrus canker and the Mediterranean fruit fly; and we believe that this latter project, in which the pest was completely and successfully destroyed, is the only case on record of the eradication of a major insect pest from any area in the world.

Found Weevil Control

Another noteworthy accomplishment of Dr. Newell's is the inauguration of the practice of thick spacing cotton to avoid boll-weevil damage. Formerly cotton was chopped to three or four feet in the row and allowed to grow into large stocks. The stalks bloomed for a long time, and when final check was made, the yield was good. However, when the boll-weevil arrived in destructive numbers some 20 years ago, this pest destroyed the late crop and reduced the yield.

Dr. Newell observed that boll-weevils did not become numerous early in the season. Consequently, he devised and recommended the practice, now universally followed in cotton fields of the United States, of leaving the cotton thick in the row and planting the rows close together. In this way a much larger number of stalks is grown. They do not grow as tall as under the former method, but they set more early (low) bolls, and good yields are obtained in spite of the boll-weevil. The pest can only take the blossoms and squares on the upper half of the stalks.

In connection with the cotton boll-weevil, Dr. Newell was the first to prove that this pest can be successfully and profitably poisoned. While secretary of the Louisiana Crop Pest Commission he did this, and he was the first to prepare successfully a powdered form of lead arsenate, which was the first poison used with profit against the boll-weevil. Later this was followed by the development of calcium arsenate in powdered form, and the calcium arsenate then came into general use in weevil poisoning.

Develops Tung Oil

Dr. Newell, in addition to all these other accomplishments, has had a great deal to do with the tung-oil industry in the United States. Seeds of this tree were sent to the Florida Experiment Station in 1912 and were planted on the station grounds, where they grew and thrived probably better than anywhere else in this country. After Dr. Newell become director in 1921, this tree came into commercial development and is now successfully grown entirely around the Gulf Coast as a direct result of the Florida developments.

During all these busy years Doctor Newell has been honored at various times by organizations of which he is a member He was president of the Association of Economic Entomologists in 1920; president of the Association of Southern Agricultural Workers in 1929-1930; president of the Gainesville Rotary Club in 1920-1921; is a fellow of the A. A. A. S.; member of Kappa Sigma, Alpha Zeta, Phi Kappa Psi, Gamma Sigma, and of the Masonic Shrine.

Beekeeping Hobby

We do not know his hobbies, but think we have accidentally discovered one in connection with another of his accomplishments. Wilmon Newell is rightfully credited with the initiation of the practice now generally followed in eradicating American foulbrood in apiaries. Here again he eradicates rather than treats. His inspectors burned all infected material the day they discovered it and then buried the ashes in a pit. His fight against foulbrood brought down on his head the wrath of the beekeepers, but he got results. Today Florida enjoys the distinction of being freer from foulbrood than perhaps any State in the Union, and other states are using the method of burning on the spot.

And now for the discovered hobby! In "Gleanings in Bee Culture," published in Medina, Ohio, in December 1934, E. R. Root says, "Dr. Newell's rise in the scientific world has been remarkable if not spectacular. In the language of the late Theodore Roosevelt, he is one of the 'useful men' who has left his impress not only upon the State of Florida, but all over the United States. While Dr. Newell was connected with the Wooster Experiment Station from 1899 to 1902, he made one or two calls in Medina. Modest then as he is now, little did I think that this mere stripling of a boy, but six feet and some, would come to be one of the great entomologists and benefactors of the country. Dr. Newell was not only a practical beekeeper, but he did some research

work in the Dzierson theory, in drones, and parthenogenesis. Does he have bees now? No, but his heart is in beekeeping, and some day he hopes to keep bees again."

But despite whatever outside interests Dr. Newell may have, he has never allowed himself to be drawn away from the varied and many great duties placed before him. By coordinating all interests, he has accomplished more, and with keener and more impartial results, as manifest in each milestone that marks his journey of progress. For these reasons it is obvious why "The Inquiring Mind" has sought out Wilmon Newell for recognition.

Virginia Tobacco Needs Potash

(*From page* 12)

Fertilizers for dark tobacco (sun-cured and shipping):

Use 10 per cent available phosphoric acid, 3 per cent nitrogen, and 4 to 6 per cent potash. Where manure is used in the rotation, 4 per cent potash in a 600-pound application of a 3-10-4 is usually sufficient.

Amount: Use 600 to 1,000 pounds per acre in the drill, thoroughly mixed with the soil about 10 days prior to transplanting.

It is hard to over-emphasize the importance of potash in producing quality tobacco. Technical Bulletin No. 12, United States Department of Agriculture, prepared by E. G. Moss et al., says, "Potash, the last constituent usually expressed in the fertilizer formula, is possibly the most important ingredient of the fertilizer mixture for tobacco when quality is to be considered. . . . Under field conditions the growing plant always shows a characteristic, more or less abnormal type of growth when this particular fertilizer constituent is deficient in the soil and not supplied in the fertilizer. The plant is smaller in size in most cases. The leaves are puckered and rough and show considerable mottling of a light-yellow color. The mottling begins at the tip of the leaf and is often followed by the appearance of small centers or specks of dead tissue. These specks later enlarge and coalesce, forming large dead areas around the margins and between the veins of the leaves."

Chlorine damage is easily recognized here.

Moss says further, "It is known that potash in some way aids in maintaining the general vigor of the plant. On those plots which were fertilized with a mixture carrying heavy rates of ammonia with little or no potash the various leaf-spot troubles have been more prevalent, causing serious damage; but with more potash added to the fertilizer there has been much less damage from leaf spot."

Potash not only contributes to the yield and aids in checking disease but also adds to tobacco that silkiness, elasticity, and fineness of texture es-

Note the rough, crinkled leaves and dead areas of the plant on the right which received no potash. These are typical potash-starvation symptoms.

sential to quality and high market value.

In conclusion the writer wishes to offer the following brief summary of what he has tried to say:

1. Since Colonial days Virginia's tobacco fields have shifted from flat Tidewater to the rolling Piedmont fields, where drainage was good, and excellent soils, rich in potash and other essential plant nutrients for tobacco, were plentiful.

2. The farmer's desire to continue to grow quality tobacco on his old farm and old fields has necessitated experimental work to help solve the problem.

3. Based on these experiments in Virginia, the writer has drawn the following conclusions relating to fertilizers for flue-cured tobacco.

(a) Ample quantity of a balanced plant food is essential for producing large yields of quality tobacco.

(b) Applications of 8 and 12 per cent potash or above those in common usage seem safe and profitable.

(c) Through medium high topping and fairly close spacing large yields of quality leaf can be obtained, provided more nitrogen is supplied and ample potash is included in the fertilizer.

(d) On sandy soils increased yields and values resulted from applying one-half of the total nitrogen and potash before transplanting and the remainder approximately three weeks after transplanting time, as a side-dressing.

4. In passing, the writer wishes to mention a phase of the tobacco industry equally as important as successful production, that of marketing. This phase, due to the antiquated system used today, is also sadly in need of research. May some of our country's best brains help us in perfecting a marketing system by which choice tobacco will bring a choice price, and common leaf a common price, and the same prices prevail for the same quality leaf at least throughout one short marketing season. This

would help to avoid the mad rush on our auction markets during October and November for the so-called "High Dollar" for mysterious classes of tobacco which, under the present lack of standard grades, no farmer knows.

Through aid of the best that scientific research can offer, Virginia will continue to hold among tobacco-growing areas that position of distinction which she acquired as the "Birthplace of the American Tobacco Industry."

Two Bolls Where One Grew Before

(*From page* 17)

Soil and climatic conditions are so variable in our cotton belt that it is impossible to develop varieties adapted to all sections. However, some varieties such as Stoneville, Delta, Pine Land, and Half and Half are widely adapted. Cottons that are early blooming and have short periods from bloom to mature boll, such as those just mentioned, and also Rucker, Cook, Acala, Mexican Big Boll, and Trice, are well adapted to the northern half of the cotton belt.

Cotton wilt is very destructive on many soils of the sandy lands of the lower South, and here wilt resistant cottons such as Dixie Triumph, Cook, Toole, and Clevewilt make the highest yields. Mississippi planters specialize in long cotton like Misdel, Express, and Wilds. Texas conditions are different from those of the rest of the belt, as the big-bolled and high-lint-percentage varieties, such as Mebane, Lonestar, Kasch, and Rowden which are well adapted to the semi-arid Texas climate, do not do well east of the Mississippi.

The late Dr. Seaman Knapp said many years ago that the use of modern farm machinery offered the greatest opportunity for cotton farmers to increase their incomes. Growers in some sections are using multiple-mule and motor-powered implements, but thousands still use one-mule implements. The enormous waste of time and man labor as a result of primitive cultural practices is one of the reasons cotton growers as a group have the lowest standard of living of any in this country. The advent of the mechanical cotton picker may force thousands to become mechanically minded, but the change is sure to prove painful to many agrarians.

Southeastern farmers depend largely on high acre yields, resulting from liberal use of fertilizers, to lower growing costs.

Communication

(*From page* 6)

First-class mail remains, on the face of it anyhow, the highest form of communication. "To communicate" originally meant to write personal notes. All the rest of this clutter of communication with which we are surrounded and submerged sprang from the cradle of letter writing.

I SEE many signs which remind me, "Don't write—Telegraph!" But I pay about as much attention to that as I do to the other sign, "Say it with flowers." My wife of course would be very much concerned about my health or mental state if I did either in her case. She usually is content to get my familiar scrawl on some grubby hotel letterhead, done at the day's end by a murky twenty-watt globe; and she would no longer upbraid me if certain tiny crosses were not found at the signature, a mild form of asininity which has fallen into disuse.

Tons of mail matter are carried to every pound transported when the nation was new. Yet I actually believe that the letters average much shorter and are less informative of detail than the ones produced by those prodigious writers of the quill-pen era, and the coming of the stenographer and the dictaphone have made many of us downright lazy in our personal communication. One has only to see the private papers of Washington to sense the value put upon writing when the fingers fashioned every dot and line.

Cheap postage, plentitude of materials, mechanical devices, and the speed and frequency of the mails make us forgetful and indifferent to the attempts of the pioneers to keep in touch with each other and the old homeland as they scouted, surveyed, and settled the frontier. Reminders of how precious communication appeared to them may help us to make better use of the enormous facilities we have today. In those days we didn't hear so many urgings to "write home to mother"; they risked their lives to maintain the overland mail. The "wandering boys" of those times at least had an alibi for silence. Every drug store as a sub-post-office, and two telegraph boys to every block were then unknown.

WE smile with tolerance as we read history. We say how horrid and provincial and blind to facts were the Westerners who fought the Mormons. We stand aghast at the cleavage between the North and the South during the forties, fifties, and sixties; saying that isolation, rural deprivation, crude communications, and unacquaintance with each other caused the prejudice and bitterness of those desolate days. We grin at the untidy and unbecoming dress of the folks who separated themselves from the cultured sections, and decry their careless civic conditions. In summation, we lay it all to bad opinion fostered by little communication or none at all.

MODERN communication systems spread the news of the World War in vivid detail and piled up ample evidence of the sorrow, ruin, debt, and havoc which it was destined to bring in Europe and America. No pains were spared to acquaint us with its horrors by photo, film, and story. Communication is even better today than then, yet it has not spared us the experience of another broil in foreign parts or prevented greed from speculating on the frenzy and madness of the hour.

Every morning's dispatch lists

fresh roadside casualties, and we hear the police sirens on short wave shrieking their way to the scene of some motor murder, while the daily table of auto tragedies brings the annual total to greater volume of needless sacrifice than the three-days' battle of Gettysburg and the slaughter at Antietam combined. All we do about it is to read the advertisements and phone our advance order to the garage for a new model with more git and gumption.

News-hawks and camera men risk their lives to fetch us all there is to know about the preventable disasters due to laxity in some civic or construction duty; we have most excellent means of reporting and promptly salvaging losses at sea. We are a great people to hold sensational post-mortem on those regrettable affairs, and then turn it over to some politician to remedy, if the taxpayers will stand for it later on. We are famous barn-door lockers when the nags are gone.

IN those days when communication was not so full and frank, we fellows slyly sneaked off to our rendezvous with pink barber-shop magazines replete with naughty art or perused tabooed yarns of nefarious highwaymen. Today they dish it up for us on calendared gloss paper and moronize us with reams of it on Sunday mornings in the syndicates.

It is idle for us to blame these conditions on organs of public information. That is equally silly with the belief that rapid communication has rid us of the provincialism and cleavage which we noticed with such concern as a canker on progress during pioneer times.

Not that we cannot hold agencies of communication responsible in many flagrant instances for causing abuse of power to go unchecked or laxity to go unnoticed. But one would naturally imagine that the growth of universal education, taste, and quick communication might breed a sounder sort of information system on which our feeble opinions might be based.

I HAVE hopes that it will. It will when we divorce profit as the principal motive from the art of communication—and I mean greedy propensities, not legitimate business pride. It will when we give free play to all sides of any question, even in schools. It will when we inaugurate a thorough training for our workers in the communicative arts, requiring ethical standards, certificates of capability and honesty, the vision of the true scientist, and the fine quality of open-mindedness which science maintains.

Then we will not have liars drawing cartoons for some upstairs tycoon who is willing to distort and pervert facts to influence votes or arouse prejudice. Then we will have wireless as pure as the air over a mountain top and just as clean and stimulating.

But why be so idealistic, so pedantic, and so impractical? Are we not getting our mud-guards reinforced and our ears well muffled against the bombasts of the 1936 campaign? Haven't we already made our mental crosses on the little ballots, so that all these fireworks and garbage tossing will be only a job for the street-cleaners? A little "kidding" won't get our goat!

So let's subscribe again, buy a new set of tubes, and hunt for some asbestos stationery. It's not quite reform time yet. A man can't reform until he's recovered! Meanwhile, stand by! In the long run cogitation, not communication, will clear the way.

Wise Guy (boarding a street car): "Well, Noah, is the ark full?"

Conductor: "Nope, we need one more jackass, come on in."

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A L'AMERICAN!

"America is a queer country," remarked the English visitor. "You put whiskey into a drink to make it strong, water to make it weak, lemon to make it sour, and sugar to make it sweet. Then you say, 'Here's to you,' and drink it yourself."

"Was it a necking party?"

"Was it! Before it started the hostess announced, 'Everybody chews his own partner.' "

One fellow who still lives on the fat of the land is the girdle manufacturer.

INTRINSIC VALUE

"Why does a woman say she's been shopping when she hasn't bought a thing?"

"Why does a man say he's been fishing when he hasn't caught anything?"

Then there was the Scotchman who received a pair of spats for Christmas and sent them out to be half-soled.

Mrs. Brookline: "I understand the Eskimos are very keen domino players, and sometimes bet heavily, even putting up their wives and losing them."

Mr. Brookline: "Well, I'll bet there are a lot of good losers among the Eskimos."

Youth: "What do you repair these shoes with?"

Cobbler: "Hide."

Youth: "Why should I hide?"

Cobbler: "Hide, hide. Cow's outside."

Youth: "Let her come in. I'm not afraid."

BENEDICTION

A preacher walked into a saloon, ordered milk and by mistake was served a milk punch.

After drinking it, the holy man lifted his eyes to heaven and was heard to say: "Oh, Lord, what a cow!"

Tommy: "Dad, what's a paradox?"

Dad: "I don't know the word, son, but I'd say it was two physicians."

A girl recently was absent from home for a couple of days, and her mother was much concerned, but everything was all right when the lass returned with a Gideon Bible under her arm.

RECOUNT

Judge: "How many children do you have, Mirandy?"

Mirandy: "Well, Judge, I has two by my first husband, one by my last husband, and then I has two of my own."

Aerial view of hoist and grinding plant at the U. S. Potash Company's mine near Carlsbad, N. M.

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